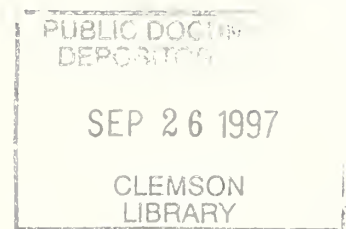


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ANNUAL REPORT 1996



WATER RESOURCES DIVISION
NATIONAL PARK SERVICE
NATURAL RESOURCES REPORT NPS/NRWRD/NRR-97/06

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The National Park Service Water Resources Division is responsible for providing water resources management policy and guidelines, planning, technical assistance, training, and operational support to units of the National Park System. Program areas include water rights, water resources planning, regulatory guidance and review, hydrology, water quality, watershed management, watershed studies, fishery management, and aquatic ecology.

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1996

WATER RESOURCES DIVISION


National Park Service
Fort Collins, CO 80525

Natural Resources Report NPS/NRWRD/NRR-97/06

June 1997



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Washington, D.C.



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A WORD FROM THE ASSOCIATE DIRECTOR, NATURAL RESOURCE STEWARDSHIP & SCIENCE

By Michael Soukup, Ph.D.

This Annual Report provides a summary of the significant accomplishments of the Water Resources Division (WRD) of the National Park Service (NPS) in 1996.

WRD provides servicewide technical assistance and advice with respect to the preservation, protection, and management of water and aquatic resources of units of the National Park System.

The Division carries out a broad-based water resources program involving leadership in a variety of activities, including water rights; water quality; floodplain management; ground water analysis; watershed and wetlands protection; water resources management planning; fishery management; policy, legislative, and regulatory analysis; information management; and training. The Division's workplan is developed by an annual call to the field to identify park needs and determine WRD priorities. In addition to national program responsibilities, the Division provides day-to-day support to parks, clusters, support offices, regional offices, and the Washington Office (WASO) in addressing the myriad of water resources issues and concerns facing NPS. The Division is located in Fort Collins, Colorado (970-225-3500), with additional offices in Denver, Colorado, Washington, D.C., and Reston and Arlington, Virginia.

I am extremely pleased with the accomplishments of WRD reflected in this Annual Report. These accomplishments are indicative of the professionalism of the Division and the ability of the Division to work cooperatively with management and staff of parks, clusters, support offices, regional offices, and WASO to effectively address water resources issues of concern to NPS. I should go on to emphasize that these accomplishments would not have been possible without the continuing cooperation and support provided by all organizational levels of NPS. These collective efforts have created the environment necessary to match the level of technical expertise to the threats faced by national parks in a changing landscape.



COMMENTS FROM THE DIVISION CHIEF

By Dan B. Kimball

As in previous years, 1996 was a very productive year for the Water Resources Division (WRD) of the National Park Service (NPS) and was characterized by a number of significant accomplishments that are reflected in this Annual Report. However, given the current Federal budget situation, 1996 was also a year of challenges in terms of providing continued Servicewide water resources leadership and extensive technical assistance and advice to parks. As evident in this Annual Report, WRD was able to achieve several very significant accomplishments in both of these areas in 1996. Some examples of significant accomplishments of the Division in 1996 include the following:

- Consummation of an historic settlement agreement with the State of Utah for water rights at Zion National Park and major progress in adjudication-related studies to support water rights claims and on-going negotiations.
- Expansion of the operating partnership with the U.S. Geological Survey (USGS) to meet the long-term water quality needs of units of the National Park System by means of USGS's National Water-Quality Assessment Program (NAWQA) (e.g., through joint funding of pilot projects involving 12 parks).
- Advancement on an interagency level of a risk-based, watershed approach to remediate water quality problems associated with inactive and abandoned mines on federal lands.
- With support of NPS's Servicewide Inventory & Monitoring Program, preparation of 30 park-specific water quality data inventory and analysis reports.
- Major progress in preparing (or assisting in the preparation of) water resources management plans, scoping reports, and issue overviews for more than 20 parks.
- Advancement of a Fishery Management Program within WRD to, among other things, assist parks in the development of fisheries management plans (e.g., at St. Croix National Scenic Riverway and Glen Canyon National Recreation Area), expand partnerships with state and federal fisheries managers, and develop greater fishery-related private-park partnerships.
- Involvement in major water resources issues facing NPS including the development of an Annual Operating Plan for the Colorado River; assessments of an experimental flood from Glen Canyon Dam and the effects of flooding of the Potomac River on C&O Canal National Historical Park; evaluation of the proposed New World Mine Project near Yellowstone National Park and the proposed Eagle Mountain Landfill Project near Joshua Tree National Park; restoration of the Elwha River in Olympic National Park; final

reclamation of a uranium mill tailings site upstream of Canyonlands National Park; evaluation of ground water issues at Cape Cod National Seashore; and assessing various NPS water resources issues associated with the implementation of NAFTA along the US/Mexico border.

- Development of a new interagency agreement between NPS and the U.S. Fish & Wildlife Service for continued cooperation between the two agencies for preparing, on a cost-share basis, National Wetland Inventory maps for NPS units and preparation of a draft revision of NPS's wetlands protection guidelines.
- Significant participation in a new natural resource management course titled "Fundamentals of Natural Resources for Professionals."
- Sponsorship of a bi-annual meeting of NPS water/aquatic resources professionals in Fort Collins, Colorado.

Many of the accomplishments listed above are described in more detail later in this Annual Report.

Consistent with the tradition of WRD, we are dedicated to providing technical assistance and advice of the highest quality to the parks and also to the national leadership on water resources matters which have Servicewide effects on units of the National Park System. I am extremely proud of the hard work and commitment to these goals that are demonstrated on a daily basis by the staff and management of WRD.

Although NPS is going through major changes as a result of the recent restructuring and budget restrictions, WRD will endeavor to remain focused on our principal mission, providing technical support to the parks. We will also endeavor to develop and implement new and more innovative, efficient, and cost effective ways to provide support to parks in preserving, protecting, and managing water and aquatic resources of the National Park System.



Washington Program Coordination Office Highlights

By
William H. Walker, Jr., Ph.D.
Program Coordinator

After a slow first two weeks of 1996 in Washington, due to government employee furloughs and major, back-to-back, snow storms, the pace soon quickened to normal for Sharon Kliwinski and myself in the Washington Program Coordination Office. We continued to represent the NPS and WRD in interbureau, interagency, and intergovernmental activities and work groups, and to directly support the Associate Director, Natural Resource Stewardship and Science, on water-related and other natural resource issues.

Early in the year we were pleased to relate WRD's experience with, and to discuss the great benefit of, establishing interagency partnerships and liaison positions during the planning for an expanded NPS role in EPA's Chesapeake Bay Program. As one outcome of a National Capital Field Area conference of senior managers and superintendents, a full-time NPS liaison was stationed in Annapolis in the Chesapeake Bay Program offices. We participated in the newly re-invigorated NPS Chesapeake Bay Task Force and anticipate increased resource management benefits for the more than 40 National Capital and Northeast Region parks in the Chesapeake Bay watershed.

Other coastal or marine activities in which Program Coordination Office staff were involved included continued coordination of NPS marine debris monitoring issues and the NPS involvement with the interagency Coastal America program. We also represented NPS at initial meetings of the recently formed Restore America's Estuaries coalition and, working in concert with the Southeast Region, the EPA led interagency task force striving to understand and ultimately improve water quality conditions which have created a hypoxic area in the northern Gulf of Mexico.

This office's role and function as NPS liaison to the U.S. Geological Survey's (USGS) Water Resources Division and, more especially, to the USGS National Water-Quality Assessment Program (NAWQA), has now become firmly established and the benefits to both organizations are evident. While cooperation in the NAWQA Program, which is designed to measure status and trends in the quality of United States waters, has led to additional jointly funded projects involving parks and NAWQA study units, our partnership has also facilitated USGS assistance on other park issues such as groundwater questions and the operation of USGS stream gages. Program Coordination Office staff continued to assist the NAWQA Ecological Synthesis Team in planning for the collection and analysis of biological information from NAWQA study units, including those encompassing parks. As a member of both the NAWQA Federal Agency Advisory Council and the USGS Ecosystem Program Advisory Committee, we conveyed NPS

needs, interests, and opportunities to those bodies. The decision to focus USGS Ecosystem Program work in the Chesapeake Bay watershed in Fiscal Year 1997 will benefit many park units with improved ecosystem understanding and interagency cooperation.

In other Washington level, multi-organizational undertakings, such as ones dealing with the Eastern Mine Drainage Federal Consortium, abandoned mineland initiatives, and the Intergovernmental Task Force on Monitoring Water Quality, this office continued to represent NPS interests. We participated on the Steering Committee overseeing the development of the Interagency Stream Corridor Restoration Handbook, a collaborative effort of more than 12 Federal agencies, and we coordinated NPS input for the General Accounting Office report on Federal assistance programs related to water quality. We participated in the Forum on Contaminants in Fish, organized by the American Fisheries Society, to facilitate better research, communication, and planning between states, the regulatory agencies such as EPA and the Food and Drug Administration, and Federal land managers about the national problem of issuing meaningful fish consumption advisories to advise the public about the implications of consuming fish caught in contaminated waters.

We worked closely in support of the Associate Director on many park resource issues, including the controversial proposed Eagle Mountain Landfill project outside of Joshua Tree National Park. Further, in response to a Congressional request to NPS, we assisted the Associate Director in drafting language for proposed research/science legislation for the NPS.

The Washington Program Coordination Office was also gratified to work on three unusually rewarding professional development and information transfer projects this year. We worked to secure funding for the initial offering in May of the training course, Fundamentals of Natural Resource Management, and also toward planning that course curriculum. We facilitated several meetings between NPS and USGS scientists and resource managers and scientists and students from Poland, Romania, Lithuania, Hungary, and Slovakia who were studying the conservation and management of wetland and riverine ecosystems in the United States. Finally, through much of the year, we worked with WRD colleagues to plan and conduct the meeting in November of WRD staff and hydrologists and fisheries biologists from other NPS offices and parks.

Although 1996 began slowly, the year was busy and productive with a noticeable theme in Washington of establishing and expanding fruitful partnerships. This focus is likely to continue into the future as we try to become ever more efficient in using scarce fiscal and human resources. Just as we said last year, every time we worked together the cooperation and support we received from our colleagues in the Water Resources Division in Colorado, and from NPS units throughout the Service, could not have been better. We look forward to serving the Division and the Service in 1997.

PLANNING AND EVALUATION BRANCH HIGHLIGHTS

by Mark Flora, Branch Chief

The year 1996 was a highly productive and rewarding one for the Planning and Evaluation Branch (PEB). For the first time since 1992, the PEB has been fully staffed (6 FTE's), which has allowed for a more than a 100% increase in the number of completed water resource management plans and technical reports, as well as a greatly enhanced level of technical support provided to the field. PEB currently provides support in the areas of water resources planning, wetlands protection, and fisheries management.

The Planning and Evaluation Branch's capacity to provide park specific support was also enhanced in 1996 by an ability to attract top-notch talent in the Water Resource Division's Hydrological Affiliates Program. Utilizing this program of cooperative resource sharing between the Water Resources Division and parks having specialized water resources skills, WRD was able to support efforts by David Mott (Buffalo National River), Jon Reidel (North Cascades National Park), and Kevin Berghoff (Glen Canyon National Recreation Area) to lead water resources issues identification and scoping assessments in Saguaro National Park, Lake Roosevelt National Recreation Area, and the Southeast Utah Group (Canyonlands National Park/Arches National Park/Natural Bridges National Monument), respectively. We look forward to enhancing the support provided to NPS units via this program in FY97 by expanding the "Affiliates Program" to include fisheries management expertise.

During the year PEB, working cooperatively with park staff and CPSU cooperators, was able to complete six water resources management plans including Big Cypress National Preserve, Big Bend National Park, Congaree Swamp National Monument, Bighorn Canyon National Recreation Area, Timucuan Ecological and Historic Preserve, and Curecanti National Recreation Area. In addition, a water resources scoping report was published for New River Gorge National River, Gauley River National Recreation Area, and Bluestone National Scenic River. WRD also provided funding support and technical assistance for the continuing efforts to complete water resources planning activities at Yosemite National Park, Acadia National Park, Cape Cod National Seashore, Great Sand Dunes National Monument, Big South Fork National River & Recreation Area, Saint Croix National River, Santa Monica Mountains National Recreation Area, Theodore Roosevelt National Park, Obed Wild & Scenic Riverway, Bandelier National Monument, and Chickasaw National Recreation Area.

It was also a very active year for the Division's Wetlands Program. PEB wetlands staff approved study plans and funding for 1996 projects at Congaree Swamp National Monument (wetland mapping), Delaware Water Gap National Recreation Area (digitize wetland maps), Gates of the Arctic National Park and Preserve (wetland inventory), Glen Canyon National Recreation Area (wetland inventory using videography), Great Basin National Park (wetland/riparian inventory and functional assessment), Indiana Dunes National Lakeshore (effects of contaminants on lagoon ecology), Mount Rainier National Park (wetland inventory and digital maps), and Rocky

Mountain National Park (wetland/stream restoration). Wetlands staff also guided the proposal development and funding process for five additional projects scheduled to begin in FY97 at Delaware Water Gap National Recreation Area (wetland restoration), Ozark National Scenic Riverways (riparian wetland study), Pecos National Historical Park (stream/wetland restoration), Petrified Forest National Park (restoration of native riparian vegetation), and at Canyonlands National Park, Grand Canyon National Park, and Glen Canyon National Recreation Area (inventory and characterize springs along the Colorado River).

PEB's two wetlands specialists worked closely with other WRD and park staff on a broad range of technical assistance efforts during 1996. Examples of assistance to parks included: 1) designing a hydrologic monitoring network and selecting reference wetland sites to guide restoration of a gravel mine at John D. Rockefeller, Jr. Memorial Parkway; 2) assisting Yellowstone National Park in evaluating potential impacts of the proposed New World Mine on wetlands; 3) assessing the feasibility of converting a sewage treatment pond into a stormwater treatment wetland at Catoctin Mountain Park; and 4) designing a wetland/riparian inventory and riparian functional assessment project at Great Basin National Park.

Servicewide activities were also an important wetlands program component in 1996. A new interagency agreement signed by NPS and the U.S. Fish and Wildlife Service (FWS) in 1996 allows continued cooperation between the agencies for producing National Wetland Inventory maps and digital products for NPS units. Under this program, the FWS has provided over \$275,000 in cost-sharing money to the NPS for wetland mapping from 1991 - 1996. Wetlands staff also reviewed and commented on a variety of proposed federal wetlands regulations during the year. New wetland regulations were incorporated into three training courses provided for NPS resource managers in 1996. Finally, wetlands staff developed a draft revision of the NPS wetlands protection guidelines and circulated it for Servicewide review. Once approved, this guidance will clarify, update, and streamline NPS policies and procedures for protecting the more than 16 million acres of wetlands managed by the NPS.

WRD's Fishery Management Program had a busy year establishing and developing new partnerships with federal, state, and non-governmental fishery conservation organizations. Coordination with the National Recreational Fisheries Coordination Council established by Executive Order 12962, provided a forum for NPS involvement in the adoption of the *National Recreational Fishery Resources Conservation Plan* and the *FWS/NMFS Policy for Conserving Species Listed or Proposed for Listing Under the Endangered Species Act*. A Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service was developed to provide fisheries management assistance to parks. Efforts initiated in 1995 culminated with the signing of an MOU with the Alliance for Aquatic Conservation which provided a framework for parks to collaborate with the nation's network of zoos and aquaria on issues involving native fish conservation, living marine resources, and freshwater mussels. WRD's cooperative agreement with the American Fisheries Society provided technical support for the development of a servicewide recreational fisheries database and for the preparation of a technical report on shark conservation in the National Park System.

The Fishery Management Program also continued working with parks to improve fishery conservation and management capabilities. Technical and policy guidance was provided to several marine parks concerning the development of commercial aquaculture and shellfishing operations within park waters. Efforts to develop an interagency Fishery Management Plan at St.Croix National Scenic Riverway continued and a joint plan with the States of Utah and Arizona was adopted at Glen Canyon National Recreational Area. PEB's Fisheries Program Manager consulted with fishery administrators and managers in the States of Arkansas, Arizona, Hawaii, Wisconsin, Minnesota, Pennsylvania, Utah, Virginia, Washington and the District of Columbia in efforts to assist parks in solving fishery management issues.

PEB (with the assistance of the Division's other branches) also reviewed approximately 100 proposed rules and regulations, environmental compliance documents (EISs/EAs) and planning documents (GMPs, DCPs, RMPs, etc.) during the year. Written comments pertaining to water-related issues were prepared for approximately 15% of the documents that were reviewed. In 1996, PEB also participated in a number of Departmental and/or Servicewide working groups including representing NPS on the DOI US-Mexico Shared Water Resources Committee, Federal Geographic Data Wetlands Subcommittee, Natural Resource Interpretation Committee, the DOI Recreational Fisheries Stewardship Initiative, and both the International and U.S. Coral Reef Initiative committees.



A New Method for Evaluating Wetland Functions

By Leslie Krueger, Wetland Biologist

Wetland managers often find it necessary to evaluate the impacts of a project on a wetland. Wetland functions that managers may wish to assess can include floodflow attenuation, water quality improvement, sediment retention, wildlife and aquatic habitat, recreation, and aesthetics. Several techniques for assessing the functions and values that wetlands provide have been in use for many years. Their utility has been limited, however, by time and energy required to perform the assessment, applicability and reproducibility of results, lack of quantifiable output, and subjectivity by the investigators. A new technique is now being developed that ultimately will provide rapid assessment, repeatable quantitative results, and a degree of objectivity in evaluating wetland functions. The hydrogeomorphic (HGM) classification approach is based on the most important characteristics that control how wetlands function. These are: geomorphic setting, water source, and hydrodynamics. These three driving forces of wetland function have different properties, that in various combinations will result in numerous regional wetland types. The following table provides an overview of the HGM classification system.

Hydrogeomorphic Class	Dominant Water Source	Dominant Hydrodynamics	Examples of Subclasses	
			Eastern USA	Western USA & Alaska
Riverine	Overbank flow from channel	Unidirectional, horizontal	Bottomland hardwood forests	Riparian forested wetlands
Depressional	Return flow from groundwater & interflow	Vertical	Prairie pothole marshes	California vernal pools
Slope	Return flow from groundwater	Unidirectional, horizontal	Fens	Avalanche chutes
Mineral soil flats	Precipitation	Vertical	Wet pine flatwoods	Large playas
Organic soil flats	Precipitation	Vertical	Peat bogs; parts of Everglades	Peat bogs
Estuarine fringe	Overbank flow from estuary	Bidirectional, horizontal	Chesapeake Bay marshes	San Francisco Bay marshes
Lacustrine fringe	Overbank flow from lake	Bidirectional, horizontal	Great Lakes marshes	Flathead Lake marshes

The initial breakdown into hydrogeomorphic classes results in wetlands with similar landscape positions. This setting determines how a wetland accommodates the flows and storage of water. Each class tends to have a distinctive combination of hydroperiod, dominant direction of water flow, and zonation of vegetation.

Water source is the second driving force in determining the functions of a wetland. The sources of water to a wetland are precipitation, lateral flows from upstream or upslope, and ground water. Each of these sources tends to have different water chemistry, which in turn influences how the wetland functions.

The third force is hydrodynamics. This refers to the motion of water and the capacity of that water to do work. Flow direction and velocity can influence sediment accretion, erosion, nutrient deposition, aeration, dispersal of seeds and other propagules, and rafting of litter.

The HGM approach is based on the principles that: 1) not all wetlands are alike so it is necessary to classify them by their shared functional properties within a geographic region; 2) functions are a way of expressing in simple terms what ecosystems do; and, 3) real wetland ecosystems should be the basis for scaling levels of functioning. These real wetlands used for scaling are called "reference wetlands." Reference wetlands are actual wetland sites that represent the range of variability exhibited by a regional wetland subclass as a result of natural processes and anthropogenic disturbances.

Currently, there are teams of researchers across the country developing models for the various regional subclasses. The National Park Service is able to provide some of the pristine wetlands that the researchers need. Yellowstone National Park provided sites for the Northern Rocky Mountain riverine and depressional wetlands study teams in 1996. Colonial National Historical Park contains reference wetlands for the bottomland hardwood forest study team. The Water Resources Division participated in the development of regional subclass models and quantification of reference areas at Yellowstone National Park and near Grand Teton National Park in 1996.

The Corps of Engineers will be using the HGM approach when they evaluate permits for wetland fills under the Clean Water Act 404 program. It will be used to determine functions of the wetland to be impacted. This will allow for a more informed permit decision as well as to design more appropriate mitigation to offset the impacts.

Other agencies, including the National Park Service, will find the HGM approach useful during the planning process. It can be used for watershed planning, identifying sensitive areas or restoration sites, developing water quality standards, evaluating project alternatives, and designing mitigation areas.

Once the HGM methods have been refined and manuals prepared for the various regional subclasses, it is anticipated that this procedure will be used in the National Park System for evaluating impacts to wetlands under Executive Order 11990 "Protection of Wetlands." Since a

Statement of Findings requires an evaluation of wetland functions, the HGM approach will be able to provide a quantitative, objective, reproducible analysis. This can then be used to insure that the National Park Service's "No-Net-Loss" wetlands policy is met. Mitigation can be designed that will replace not only lost wetland acreage but also lost wetland functions.

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Water Resources Management Planning at Timucuan Ecological and Historic Preserve

by David L. Vana-Miller, Hydrologist

Timucuan Ecological and Historic Preserve, established by Public Law 100-249 on February 16, 1988, is located on the northeast coast of Florida (Duval County) entirely within the city limits of Jacksonville. The preserve encompasses approximately 46,000 acres, 75% of which are waterways and wetlands that form an extensive estuarine/salt marsh ecosystem between the Nassau and St. Johns rivers where they meet the Atlantic Ocean. Much of the salt marsh is among the least disturbed on the southern Atlantic Coast. This estuarine system provides important spawning and nursery grounds for many economically important fish and invertebrates.

These wetlands and waterways are notable for several reasons: both rivers are unusual in that they discharge directly into the Atlantic Ocean rather than into an embayment as is typical of most estuaries; the St. Johns River flows northward, one of the few major north-flowing rivers in North America; the Nassau River is the only major drainage on the east coast of Florida not channelized or stabilized by engineering structures, especially at the ocean inlet; the estuary is the largest marsh-estuarine system on the east coast of Florida, and is the only example of an Atlantic Sea Island estuarine system in Florida; the area is classified as Outstanding Florida Waters with strict water quality criteria; the preserve contains the last class II waters (suitable for shellfish harvesting) in Duval County; and the area provides habitat for several state- and federally-listed rare, threatened, or endangered species.



they discharge directly into the Atlantic Ocean rather than into an embayment as is typical of most estuaries; the St. Johns River flows northward, one of the few major north-flowing rivers in North America; the Nassau River is the only major drainage on the east coast of Florida not channelized or stabilized by engineering structures, especially at the ocean inlet; the estuary is the largest marsh-estuarine system on the east coast of Florida, and is the only example of an Atlantic Sea Island estuarine system in Florida; the area is classified as Outstanding Florida Waters with strict water quality criteria; the preserve contains the last class II waters (suitable for shellfish harvesting) in Duval County; and the area provides habitat for several state- and federally-listed rare, threatened, or endangered species.

Lands within the preserve are owned by three federal agencies, the State of Florida, the City of Jacksonville, private corporations, private conservation organizations, an electric authority, and individuals. Presently, only 20 to 30% of the total

acreage is in National Park Service ownership. In addition, estuarine wetlands and waters within the preserve are claimed under sovereignty by the State of Florida up to mean high water.

The City of Jacksonville has jurisdiction over zoning and land use decisions within the preserve. The city will adopt new regulations for the preserve as part of its special management area requirements. This designation is part of the city's efforts to comply with state land use policies and grants the preserve special status in land use decision making. These regulations are expected to eliminate many uses that would constitute new construction.

Because of the complex ownership and jurisdiction patterns within preserve boundaries, the preserve's general management plan (1996) proposed establishment of a "Timucuan Alliance." This alliance is a cooperative venture of the numerous and diverse landowners (over 40 entities with landownership and/or jurisdiction within the preserve) where the shared vision, management objectives, and responsibilities for resource management and protection preserve-wide would be pursued through formal agreements, collaboration, cooperation, and/or partnerships among federal, state, and local government agencies, and private landowners. This partnership approach will establish guidelines for management and use of water resources and will identify and address potential problems or concerns preservewide. To achieve effective, coherent, and cohesive water resource management, these entities must share responsibility for planning, funding, and implementing management actions.

Because the preserve is largely a hydrological phenomenon, water-related issues naturally dominate. For that reason, land use within and adjacent to the preserve as well as land use anywhere in the watersheds, connected by either groundwater or surface water, has the potential to affect the preserve. While information exists concerning the water resources of the preserve, systematically collected information and adequate analyses addressing the preserve's water resources are lacking. The primary purposes of the preserve's water resources management plan (1996) are to provide information on potential threats to water resources of the preserve and guidance on immediate actions that can prevent or mitigate water resource degradation. When more information becomes available or different/modified actions are needed, the alliance could revise the plan, as needed. This water resources management plan is intended to accomplish the above purposes and provide water resources protection in the short-term until mutually beneficial, cooperative ventures are put in place by the alliance. To this end, the plan recommends a "blueprint" for addressing water resource issues and prescribes an action plan for managing its water resources over the next 5 to 10 years.

Water resource issues identified as most pressing include: 1) coordinate efforts among government agencies and academic institutions; 2) protect water resources through land use planning efforts both in and outside the preserve; 3) preserve and/or restore surface water hydrology in the estuary; 4) preserve and/or restore good surface water quality within the preserve; 5) preserve and/or restore good ground water quality within the preserve; 6) preserve Spanish Pond hydrology and water quality; 7) maintain a healthy salt marsh system; 8) maintain healthy freshwater wetlands; and 9) track park development projects and mitigate associated impacts. The water resources management plan presents 12 management recommendations, in

the form of project statements, that constitute the "blueprint" for addressing these water resource issues.

Soon after its completion, alliance members were invited to the preserve to discuss the water resources management plan. Members were asked if they would make any changes to the lists of water resource issues and management recommendations. Few changes were proposed and the end result was that these changes were included as sub-elements of the original lists. Finally, to provide future direction for the division of limited resources, the group was asked to prioritize the list of management recommendations (see table). This list and the realization by all attendees to continue and improve communication within the alliance were the real successes of this meeting.

Management Recommendations for Timucuan Ecological and Historic Preserve in Descending Order of Priority

Conduct Ecological Systems Analysis of the Preserve
Investigate Hydrologic Conditions of the Estuary Including Ocean Inlets
Assess Current Water Quality, Determine Standards, and Design Monitoring Program
Understand Preserve-wide Water Resources and Land Management Activities
Conduct Baseline Survey of Wetland Flora and Fauna
Conduct Nekton Inventory and Determine Monitoring Program
Conduct a Comparative Evaluation of Physical and Biological Water Quality Parameters
Investigate Paleo-ecology of Salt Marsh
Establish Cooperative Agreements for GIS Products

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Managing Park Fisheries: Implications of Executive Order 12962

by Frank M. Panek, Ph.D.
Fishery Biologist

On June 7, 1995, President Clinton signed Executive Order 12962 to improve the quality, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities. The Order requires federal agencies to strengthen efforts to improve the quality of rivers, streams, and lakes supporting recreational fisheries. In addition to specifying federal agency duties, the order established a National Recreational Fisheries Coordination Council co-chaired by the Secretary of the Interior and Secretary of Commerce, set timelines for adoption of an interagency fishery conservation plan, and established the role of the Sport Fishing and Boating Partnership Council in implementing the order. The Water Resources Division represents the National Park Service (NPS) on the Coordination Council.

One of the first tasks of the newly formed Council was to develop an interagency plan that could be endorsed and adopted by all federal agencies either responsible for managing or regulating fisheries resources. This was a daunting task. Each agency has unique legislative mandates, and it was clear from the onset of the planning effort that it would be difficult to accommodate each agency's management perspectives and responsibilities. It was also clear that the plan would need to be implemented without any new funds from Congress. On June 3, 1996, after over a year of work, the Secretary of the Interior and the Secretary of Commerce jointly announced the adoption and implementation of an interagency *Recreational Fishery Resources Conservation Plan*.

The conservation plan endorsed by NPS and 23 other federal agencies provides a generalized framework for the federal government's efforts to restore fishery resources, aquatic habitats, and to improve the nation's recreational fisheries. The national goal of the plan is to:

"Provide for increased recreational fishing opportunities nationwide through the conservation, restoration, and enhancement of aquatic systems and fish populations, and by increasing fishing access, education and outreach, and partnership opportunities."

The plan provides measurable objectives for the conservation and restoration of aquatic systems and fishery resources, defines actions to be taken by the agencies, ensures agency accountability, and provides a comprehensive mechanism to evaluate achievements. Each federal agency contributes to the plan by implementing programs consistent with its mission and responsibilities. The overall objectives and goals of the plan are met by the combined efforts of the 23 signatory agencies. For instance, NPS and U.S. Fish and Wildlife Service

are largely responsible for programs to restore fish populations and habitats, the U.S. Environmental Protection Agency works to protect and improve water quality, and the U.S. Coast Guard works to insure safe boating and navigation.

National Park Service's *Agency Implementation Plan* was adopted by the Director on January 31, 1997. This plan was developed by the Water Resources Division and draws extensively upon many of the action items in the Service's existing Recreational Fisheries Program, *A Heritage of Fishing*. This later program, adopted by the Service in 1992 in response to the development of a National Recreational Fisheries Policy, established a framework for management of the unique resources and recreational opportunities in the National Park System. The program emphasizes the management and restoration of wild fish populations, the maintenance of genetic variability, and the protection of ecological diversity. Management activities may involve protecting and restoring native fish populations, prohibiting the introduction of non-native hatchery stocks into park natural areas, reducing or eliminating competition with exotic species, and restoring damaged or altered habitats through improved watershed management practices or by habitat restoration. The program also encourages park managers to improve public understanding of aquatic ecology and angler ethics, to promote research of fisheries and aquatic systems, and to improve the quality of recreational opportunities available to the public.

Water Resources Division's Roles and Responsibilities

The Water Resources Division has the program lead for overall coordination with the Recreational Fishery Resources Conservation Council and for preparing annual accomplishment reports. The following action items or tasks represent WRD's responsibilities towards achieving the objectives of the Director's *Agency Implementation Plan*.

- ◆ Develop an action list of high risk fish populations and stocks and implement strategies and projects for monitoring and restoring these fisheries.
- ◆ Develop and maintain a servicewide Recreational Fisheries Database of basic fishery and user information and prepare a summary report of recreational fishery opportunities.
- ◆ Determine the status of Fishery Management Plans and Water Resources Management Plans in NPS units with recreational fisheries. Develop, implement, and revise these plans while providing for active public, federal, and state involvement.
- ◆ Develop a standardized angler creel survey to provide basic monitoring of catch, harvest, and angler success rates that can be implemented by resource managers in any park with recreational fisheries.

- ◆ Continue participation in *National Fishing Week* (NFW) programs and provide information and guidance to parks to encourage increased park participation. Work with federal partners and the sportfishing community to annually host the NFW "national event" in Washington, DC.
- ◆ Replace the outdated 1983 servicewide brochure on *Areas with Sport Fishing Opportunities* with a new brochure on recreational fishing and fisheries conservation that reflects 1988 Management Policies and emphasizes catch-and-release fishing.
- ◆ Encourage participation of state fisheries management agencies in fishery management planning for national park units and develop interagency plans where possible and practical.
- ◆ Establish and administer cooperative agreements with other federal agencies at the national levels to provide for the exchange of technical assistance and to develop cooperative projects to benefit the management of aquatic/marine resources in national park units.

Park Roles and Responsibilities

As a signatory partner to the *Recreational Fishery Resources Conservation Plan*, the NPS has responsibilities to integrate recreational fishing opportunities and programs into park resource management and interpretive programs where feasible and practical and to work to protect and restore native fish populations, assemblages, and habitats. Specifically, the *Agency Implementation Plan* recommends that parks integrate the following action items or tasks into existing programs:

- ◆ Provide recreational fishing opportunities for physically challenged park visitors by involvement in the *Fishing Has No Boundaries* program, or other similar programs.
- ◆ Restore and improve docks, fishing piers, fish cleaning stations, boat ramps, and trails supporting recreational fishing activities.
- ◆ Work with the local communities, state and federal partners, and sportfishing and conservation organizations to host the *National Fishing Week* events.
- ◆ Include activities to introduce children to fishing, angler ethics, and environmental stewardship in park interpretive and educational programs. Integrate *Pathways to Fishing* as a major teaching component in these programs when practical.
- ◆ Establish and administer cooperative agreements with other federal agencies to provide for the exchange of technical assistance and to develop cooperative projects to benefit the management of aquatic/marine resources.

Reporting Requirements

The Recreational Fishery Resources Conservation Plan and each supplemental Agency Implementation Plan will remain in effect for five (5) years (FY1996-FY2000). As specified in Section 5 of the Executive Order, each agency implementation plan will be reviewed by the Sport Fishing and Boating Partnership Council on an annual basis. It is also recognized that these plans are dynamic and may be revised or modified at any time to reflect changing needs, priorities, and fiscal realities.

WRD will prepare an annual report of accomplishments for the fiscal year to be presented to the National Recreational Fisheries Coordination Council by March 31st of each year beginning in 1997. Parks are urged to report programs and accomplishments consistent with the Service's obligations under the *Agency Implementation Plan* to the Division by January of each year.



WATER RIGHTS BRANCH HIGHLIGHTS

by Chuck Pettee, Acting Branch Chief

The year 1996 was a busy year for the NPS water rights program, punctuated by a major accomplishment and the retirement of a leader. Continuing adjudication-related studies to support claims and on-going negotiations, participation in state administrative actions to protect park water rights and resources, and assisting parks with water rights questions such as the proper use of historic water rights properties were the mainstay of our work load. Late in the year, a settlement agreement for water rights at Zion National Park was completed with much fanfare by Secretary Babbitt and Utah Governor Leavitt. (You can read more about this in one of the following highlight articles.) Although similar settlement agreements have been secured for park units in Colorado, Idaho, and Montana, this involved the most complex and contentious situation of any because Zion is not a headwater park, nor a park with small water needs. And, a big change occurred on November 1, 1996, when Owen Williams retired from federal service. As Water Rights Branch (WRB) Chief, Owen has directed the Service's water rights program for about eight years. The Service paid tribute to Owen for his accomplishments when Secretary Babbitt presented him with the Department's Meritorious Service award. It is because of his leadership that the NPS water rights protection program has been successful. Until the branch chief position is filled, Dan McGlothlin and Chuck Pettee will be directing the program.

As you will read in a following article, we took a major step in management of the NPS water rights documentation files (i.e., dockets). We have acquired the hardware and software to scan all of the important dockets materials into electronic format. Eventually these files will be available to parks and Systems Offices. This will allow the valuable original documents to be stored in a climate controlled and disaster-proof location.

Water Rights Branch staff have enjoyed a good working relationship with attorneys at several offices of the Solicitor around the country. As our program has grown, our needs for legal assistance have outpaced the ability for some of these offices to assist. To address this growing concern, NPS initiated an arrangement with Solicitor Leshey that allows NPS funding to support one full time attorney, located in the Rocky Mountain Regional Solicitor's office and dedicated to assisting NPS with water rights issues. The position is temporary; its success will be reviewed after two years. We welcome Peter Fahmy, formerly with the State of Colorado Attorney General's office, to this position.

WRB has directed more water rights oriented monitoring activities in FY96 than ever before, and as more adjudications are completed, we anticipate the NPS need in this area will continue to mount. While it is a great thing to secure water rights for NPS units, an even greater challenge, perhaps, is to ensure they will be protected into the future. Indeed, resource protection is as much dependent on the later as the former.

Heading into 1997, we are confident that negotiation rather than litigation will be the general rule for resolving NPS issues in adjudications. We anticipate that the Zion settlement will open the door for the other Utah parks, and our optimism continues for potential settlements in other states.

Remember, park management and staff are more aware than WRB staff of issues in and surrounding their parks and the potential for impact to water-related resources or water rights. We are thankful for the availability and professionalism of park management and staff and appreciate their critical role in the success of the NPS water rights protection program. We continue to encourage field managers to call upon WRB whenever water rights issues are, or could be, affected by management decisions or proposals by park neighbors.



Federal Reserved Water Rights Recognized at Zion National Park

by William R. Hansen and Daniel J. McGlothlin, Hydrologists

Federal reserved water rights for surface and ground water at Zion National Park were recognized in a signing ceremony on the banks of the North Fork of the Virgin River in December 1996. Secretary Babbitt, Utah Governor Leavitt, Zion Superintendent Falvey, and representatives from Washington and Kane Counties signed the agreement for Zion recognizing the first Federal reserved water right for a national park in Utah. The agreement culminated five years of negotiation and secures instream flows and ground water to protect the East and North Forks of the Virgin River and hanging gardens while providing a dependable water supply for local communities.

The NPS Water Resources Division initiated studies in 1987 to support water rights claims in the Virgin River Adjudication and to address the threat of 37 proposed upstream dams. Fourteen studies were conducted to estimate the amount of water necessary to fulfill park purposes and maintain water resources in an unimpaired condition. Investigators studied the dependence of water-related resource attributes on flow including water and sediment discharge, age and origin of ground water, channel forming processes, riparian vegetation, native fisheries, aquatic organisms, hanging gardens, aesthetics, and recreational use. Between 1987 and 1990, little progress was made in settlement due to traditional state and federal government rivalries and a lack of scientific data to support NPS claims. In 1992, NPS and attorneys from the Office of the Solicitor and the Department of Justice, reopened negotiations to explore settlement options. In 1993, a technical workshop was organized to present study conclusions and expert opinions to the State and Washington County Water Conservancy District (WCWCD) and to discuss NPS entitlement to and the need for water rights at the park. Scientists and historians presented data and information to support water rights for instream flows and ground water to protect Zion's ecosystem values.

Equipped with a new understanding about the dependence of water-related resources on stream flows and ground water in the park, NPS, the State, and WCWCD formed a technical team to develop and evaluate settlement proposals. Each proposal addressed park protection and the flexibility to develop a limited future amount of water. During the proposal formulation and evaluation process, the team continued to consult with scientific experts and reached agreement on settlement concepts in May 1996. Legal counsel developed and prepared the final settlement language.

The final agreement recognizes a Federal reserved water right to all the unappropriated flows in and above the park and allows valid existing uses to continue. It limits total depletion and subordinates to a small amount of water development above the park. Conditions of subordination prohibit construction of proposed mainstem dams on the East and North Forks of the Virgin River and a transbasin diversion to Cedar City. It recognizes state appropriative and future Federal reserved water rights for administrative purposes at Zion and specifies

diversion limits and periods, and bypass flows, for new diversions and storage reservoirs above the park. The agreement also establishes a 2-mile ground-water protection zone on the northern, eastern, and southern boundary of Zion which restricts development of high capacity and high volume wells.

The agreement will be effective upon completion of a land exchange between the U.S. Bureau of Land Management (BLM) and WCWCD for public lands at the proposed Sand Hollow Reservoir site downstream of Zion and private property above the park. The exchange removes a long standing threat that WCWCD would construct Bullock Dam above Zion and allows the District to develop a reservoir downstream of the Park to provide water for St. George, Utah. Completion of the land exchange is expected to occur in 1997. The historic agreement will then need to be confirmed by the State adjudication court before water rights are decreed. Should objections arise, Utah and Washington and Kane Counties have agreed to stand "shoulder-to-shoulder" with NPS in support of the settlement.

At the signing ceremony, the Secretary and the Governor praised the work of the negotiation team and encouraged the continued use of "good science" and cooperative efforts to solve complex water rights issues in Utah. This agreement forever protects water resource values at Zion and establishes a process that can be used to complete settlements of this nature at other Utah parks. It is doubtful that NPS could have secured this impressive set of protections through litigation.



Computerization and Storage of Water Rights Records

By Bernadette Berger, Research Associate & Assistant System Analyst

The Water Rights Branch (WRB) is home to approximately 1,250 file folders containing documents related to the authorization of water rights at NPS units Servicewide, including documentation by State authorities, water use documentation, legal opinions, supporting hydrologic data, land history, administrative agreements and maps. These files, called water right dockets, contain original documents which would be critical to protection of park resources in the event NPS water rights are threatened by competing water uses. To secure this fundamental element of water rights protection, WRB has been working to improve the docket filing system (see related article in the 1991 WRD Annual Report). In 1991, while fulfilling a contract to organize the docket file structure, a record manager ascertained that much of the information contained within the files would be lost due to deteriorating quality if a preservation plan was not implemented. As a result, WRB began development of an electronic imaging system for maintaining docket materials that would allow access to information while protecting the original documentation from further damage and providing a backup copy in case of disaster.

First a scan of the original document creates a digital image of each page in the water right record. Before the image is altered in any way, it is saved onto a compact disk (CD) (with read only capability) in TIFF format. The unaltered image is a legally defensible backup for the original document in case it is needed in a court or administrative proceeding. From this first image, an enhanced image is created to improve the legibility of the document. The images are then electronically organized much like a filing cabinet with an index for the electronic retrieval system. The opening screen lists the parks for which water right documentation is available on that CD, information on how to use the CD and a description of the docket filing system. Selection of a park takes the user to a second screen that lists all of the docket folders for that park. The park screen lists important information about the docket, such as its number, region, area, state, and type of water right. Selecting a specific docket takes the user to a page selection screen with categorized information including a description of the documents contained in the docket and links to their images. The user can then print or view the document page by page. The simple design of the HTML (Hypertext Markup Language) pages assures clear screens from any internet browser. This electronic imaging system assists the user in navigating through many water right documents, transmitting the images quickly, and allowing use by many different access systems.

When all the documents for a park are scanned into the imaging system and the newly created CD is verified, the original documentation, the CD containing unaltered images, and a copy of the CD containing enhanced images will be stored in an environmentally controlled site with 24-hour access. The storage site's temperature, humidity, and fire protection controls must meet current record management standards. All of the items stored at this site require special clearance to retrieve. A second copy of the CD containing enhanced images becomes the

working copy that NPS staff can reference or duplicate as necessary. NPS staff at parks, support offices, or regions will be able to quickly retrieve copies of the documents containing essential information for research or to assist with water management decisions. The electronic imaging files can be easily updated to include new documents, new water right docket files, or any new information pertinent to a water right; thereby helping to ensure that the water right records are accurate for each park unit. The development of CD-ROM technology as an image storage solution allows WRB to create an electronic system that improves Servicewide accessibility to water right records while providing security and disaster protection for the original documents.



WATER OPERATIONS BRANCH HIGHLIGHTS

By William L. Jackson, Ph.D
Branch Chief

The Water Operations Branch (WOB) administers park assistance programs in water quality management and hydrology. Water quality management activities in FY96 were divided between direct assistance to parks addressing water quality management and compliance issues, and servicewide programs to support park water quality inventory and monitoring needs. The hydrology program was involved almost exclusively in direct support to parks on issues such as ground water protection, stream management and restoration, and floodplain assessment and compliance.

The Branch's water quality database project, implemented in conjunction with the servicewide Inventory and Monitoring Program, has produced "Water Quality Data Inventory and Analysis" reports for over 80 parks. A major part of this project involves acquiring and formatting National Park Service water quality data and uploading it into the EPA-STORET national water quality database, so that it can be analyzed in context with other available water quality data. An update on the water quality database project is provided in the following article by Dean Tucker.

WOB continued to oversee the NPS water quality monitoring partnership with the U.S. Geological Survey's National Water-Quality Assessment (NAWQA) program. Twelve parks have been involved in that program, which consists of a combination of synoptic inventory studies, intensive water quality investigations, and long-term fixed-station monitoring. One of FY96's most visible accomplishments of this monitoring partnership involved publication of the results of intensive investigations at Lake Mead National Recreation Area, where hormone-disrupting chemicals were found in water, sediment, and fish tissue (carp) in the Las Vegas Wash arm of Lake Mead. A report summarizing all NAWQA partnership program results in FY96 is available from WRD.

The Water Quality Program's technical assistance activities were extremely varied in FY96. Over 30 parks obtained assistance in interpreting the fate and significance of contaminants data in aquatic environments. Roughly 20 parks including Channel Islands National Park (livestock grazing), Glen Canyon National Recreation Area (bacteria standards), Bryce Canyon National Park (spring water quality), Cape Cod National Seashore (kettle ponds) and Bandelier National Monument (subdivision proposal), obtained assistance in dealing with water quality inventory, monitoring, compliance, and enforcement issues. A number of other parks including Olympic National Park (dam removal), Canyonlands National Park (uranium tailings), and Yellowstone National Park (historic and proposed mining) obtained assistance in dealing with water quality issues in planning and National Environmental Policy Act (NEPA) documents. Finally, as described in the following article by Lolcama, et.al., WRD provided considerable support to a funded project at Big South Fork National Recreation Area to characterize and prioritize on a watershed basis abandoned mine sites for water quality remediation.

The Branch's hydrology program provided direct technical assistance to over 60 parks. WOB was involved in negotiating the terms of the March, 1966, experimental flood from Glen Canyon Dam through Glen and Grand Canyons. In June, the Branch organized a seminar for Colorado River parks to present and discuss the results of the flood on sediment transport and sandbars. We also responded quickly to the 1996 winter floods at the C&O Canal National Historic Park, by helping the park interpret structural and design situations which make the canal vulnerable to flood damage. The final EIS on Elwha River dam removal at Olympic National Park was issued in 1996. WOB provided considerable input to the EIS by assisting in modeling the effects of dam removal on downstream suspended sediment concentrations.

Ground water management issues continue to grow in importance in the National Park System. Over 20 parks obtained assistance on ground water management and quality issues. WOB helped initiate, in cooperation with EPA, well-head protection programs at three parks. We assisted Guadalupe Mountains National Park in solving a problem of iron bacteria in its water supply, and assisted in developing a new water supply at Lyndon Johnson National Historic Park. The Branch assisted Cape Cod National Seashore and the Water Rights Branch in developing a ground water monitoring plan and is assisting the park in working with the Lower Cape Water Management Task Force in developing an aquifer management plan for the outer cape. Finally, as described in the following article by Mike Martin, WOB assisted Mesa Verde National Park in analyzing and solving a situation involving damaging seepage into a prehistoric cliff dwelling.

In reviewing the itemized listing elsewhere in this report of FY96 Branch accomplishments, I hope you are struck, as I am, by the great variety of technical support provided to parks. I believe this stems from the wide range of technical specialties represented on the staff, our willingness to be versatile and responsive to park needs, and our experience in applying our expertise to helping park managers solve problems in the broader planning and policy arenas.





An experimental “habitat-building” flood was released from Glen Canyon Dam for one week in March, 1996. The purpose of the high-flow release was to assess its effectiveness in rebuilding sandbars and associated aquatic, riparian, and recreation habitats in Grand Canyon which are progressively lost to erosion during normal dam releases. This was the first time a large Federal dam has been used exclusively to benefit downstream natural resources. While the flood was important to both Glen Canyon NRA and Grand Canyon NP, it also has important ramifications for regulated river management throughout the western United States.



Ancient Dwellings and Modern Water; Hydrogeologic Considerations in Archeological Preservation, Mesa Verde National Park

By Michael Martin, Hydrologist

In November of 1995, staff at Mesa Verde National Park observed water seeping from a rock shelter and wetting one of the largest and most visited cliff dwellings in the park, Cliff Palace. While moisture in this area is not unprecedented, it is by no means a regular occurrence, and, its presence poses a significant threat to the structural integrity of the cliff dwellings. Park staff requested emergency assistance from the Water Resource Division in completing a hydrologic assessment of the Cliff Palace area to determine the cause of the seepage and suggest possible strategies for remediation.

The primary question was: "Is this a natural occurrence or has it been caused, or exacerbated, by park activities?" During wet periods, this would likely be a location for seepage. The scallop shaped indentations that form on cliff faces and ultimately evolve into rock shelters, like the one that houses the Cliff Palace dwellings, are often initiated by groundwater discharge at the cliff face. In addition, the presence of numerous springs and evaporite deposits at the same stratigraphic level as the floor of Cliff Palace indicate that this is a natural groundwater discharge zone.

Occurrences of prior moisture at different locations within the shelter are recorded throughout this century. The earliest reference found was in 1912 with additional references in 1943, 1946, 1948, 1952, and 1960 (Horn, 1988). Furthermore, Park staff recalled an event similar to the most recent one that occurred in the month of April in the early 1980's. The period with the greatest recorded precipitation in the park was in the late 1930's and early 1940's, which may be related to the numerous references to seepage around that time. Based on both the local geology and the recorded history, seepage in this area is not only a possibility but at certain times a likelihood.

Conversely, there are at least two lines of evidence that suggest this most recent incidence is not entirely natural. First and foremost, is the late season timing of the event which occurred well past the normal runoff period. Second, while this general area has certainly experienced natural seepage, this specific location could not have been subjected to frequent wetting. These structures have been abandoned for about 700 years, and some of the affected dwellings still have original plaster. Given the detrimental effect of water on this type of construction, it is very unlikely that these particular dwellings have been subjected to repeated wetting during their history.

To determine which of these possible sources was the cause of the seepage, the means by which the water entered the shelter needed to be discerned. This required a detailed examination of the site specific geology. All of the sedimentary strata in the vicinity of Cliff Palace are part of the same formation, the Upper Cliff House Sandstone (Irwin, 1966). However, to understand the interaction between the rocks and water, this formation must be subdivided into three distinct units based on lithology and resulting differences in permeability. The rock unit that contains the cliff dwellings in this area is roughly a 100 foot thick layer of massive sandstone. This fairly homogeneous layer is sandwiched between two layers of siltstone beds that have much lower vertical permeabilities. The resulting flowpaths that infiltrating water would take would be near vertical in the sandstone, and more horizontal in the siltstones (Fetter, 1994). Consequently, any water entering the sandstone from the surface would tend to flow down until encountering the less permeable siltstone bed. From there, the groundwater would trend more horizontally, possibly discharging at the sandstone siltstone interface. This is the process that causes the springs and evaporite deposits previously mentioned.

The bulk permeability of the sandstone is a combination of interconnected pores and fractures in the rock. A primary fracture pattern exists in the massive sandstone trending north-northwest to south-southeast, or roughly parallel to the shelter opening (see photo). Within the rock shelter itself, there are three primary vertical fractures exposed in the ceiling, all with apparent desert varnish, an indication of prior wetting. The primary conduit of moisture in the rock shelter during the 1996 event was the vertical fracture closest to the rear of the shelter.



the 1995 incident.

After determining that the vertical fracture at the back of the shelter was the area that supplied the water, it was necessary to look for possible sources on the surface. In the early 1960's, the park constructed considerable visitor-use infrastructure on the mesa overlying Cliff Palace, including a comfort station with leach field, a parking lot, and a water line, all of which could affect the amount or timing of recharge water on the mesa top. The mere presence of these features does not indicate an anthropogenic source of the water; otherwise, there would have likely been some evidence of increased moisture within a number of years of their emplacement. However, the vertical proximity of this infrastructure to Cliff Palace strongly suggests that anthropogenic water could have caused

Hydrologic budget estimates for the natural system vary dramatically, mostly because of the uncertainty associated with subsurface flowpaths. Nevertheless, conservative values were used to obtain a range of estimates (Dunne and Leopold, 1978; Wilson Et. Al., 1980). Comparison of both natural and anthropogenic estimates of input indicate that the leach field and water line operations could contribute anywhere from 27 to 230 percent of natural inputs to the immediate recharge area over Cliff Palace. Furthermore, a runoff ditch located on the mesa and possibly intersecting vertical fractures in the sandstone, receives runoff from the entire parking lot and water that is bled from the water line supplying the comfort station.

The last and most convincing piece of evidence supporting the theory that the seepage was primarily anthropogenic was derived through a detailed topographic survey of the Cliff Palace area.

The goal of the survey was to determine what infrastructure on the mesa surface, if any, intersected the fracture that transmitted the water. After accurately determining the three-dimensional orientation of the fracture pattern and the infrastructure on the mesa top, it was unequivocal that the fracture and the runoff ditch intersected on the surface (Figure 1).

Conclusions

The water that entered Cliff Palace in the Fall of 1995 was primarily of anthropogenic origin. Precipitation from recent wet years likely filled most of the available storage in the massive sandstone. Additional pulses of water associated with water line maintenance, discharged directly to a ditch which intersected a vertical fracture, was enough to produce substantial seepage.

Following these conclusions, Park staff discontinued piping water to the mesa top, replacing the comfort station with portable toilets and the drinking fountains with water in a tank trailer. Subsequent to these modifications in visitor services, no additional seepage has been observed in the area impacted during the Fall of 1996.

The implications for management of cliff-side cultural sites are widely applicable. In terms of ancient dwellings, no water is good water. Natural fluctuations in precipitation are likely to produce seepage in critical areas on a periodic basis. However, any addition of anthropogenic water runs at least some risk of impacting nearby sites either through direct saturation or weakening of the surrounding rock structure. This is not to say that all water impacts nearby sites, because much volume is lost from the system through springflow in benign areas, evaporation on the rock surfaces, and deep aquifer storage. Nevertheless, the risk of impacting cultural sites may outweigh the benefits of water use. Consequently, prior to any development of water-related infrastructure in similar locations, a detailed hydrologic analysis, including the groundwater regime, should be conducted.

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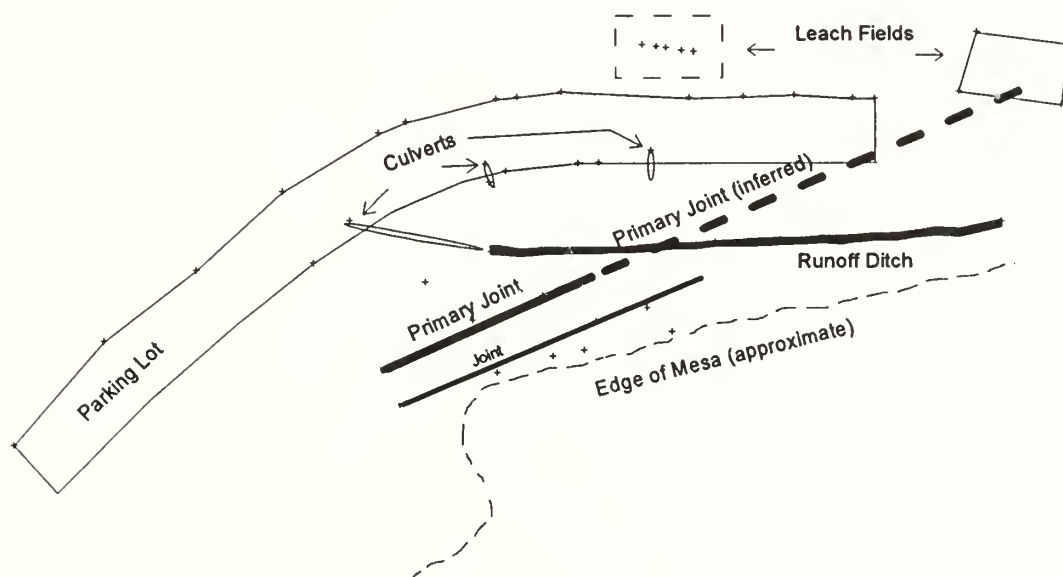


Figure 1. - Schematic diagram (plan view) of natural features and infrastructure derived from survey data in the Cliff Palace area, Mesa Verde National Park. Dashed Lines indicate inferred or approximate location of features. Note intersection of the runoff ditch and the primary joint.

Using the Watershed Approach to Identify, Characterize, and Prioritize for Remediation Water Quality Impacts from Contaminated Mine Drainage's in the Big South Fork National River and Recreation Area, Kentucky

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INTRODUCTION

Contaminated mine drainage (CMD) from abandoned and inactive minelands (AML) on Federal lands represents a serious water resource and land management problem. Over 145 National Park Units contain over 2500 abandoned mine land (AML) sites while the collective estimates for AML's on U.S. Forest Service and Bureau of Land Management lands approach one-million sites. Identifying, properly characterizing, and reclaiming every site where mining has occurred would be a time consuming and expensive process. An alternative to site-by-site remediation is to identify, characterize, and remediate sites within a watershed that most substantially impact water quality and water-quality dependent attributes. Such an approach, appropriately named the Watershed Approach, is currently being examined by the EPA and the Federal Land Management agencies as a suitable alternative process to address the AML problem. The watershed approach to AML remediation consists of five major stages: (1) Statewide Analysis and Watershed Prioritization; (2) Watershed Characterization; (3) Site Characterization and Prioritization; (4) Remediation; and (5) Monitoring.

The approach is pragmatic in that instead of remediating sites in isolation from each other, streams and sites within watersheds are given priority when their treatment would improve water quality for the entire watershed. In addition, the process places a high premium on intensive and proper characterization of the waste so that proper remedial practices can be designed and implemented. Recent work published by the Department of Energy on the failure of passive treatment systems for contaminated mine drainage indicates that while many implementations of passive treatment technologies have been effective at treating CMD as intended, there have been a significant number that have partially or fully failed to fulfill their intended objectives (Hyman and Watzlaf, 1995). One of the primary reasons treatment systems fail is inadequate site and drainage characterization, including sampling and analysis of drainage chemistry with accurate flow measurements. If there were problems in characterizing the mine drainage and understanding its chemistry, then there can be problems in understanding and evaluating the system's performance after implementation of treatment measures. In fact, errors in site characterization can propagate throughout the design and implementation processes. The problems associated with improper characterization of a CMD system do not heal as the consequent remediation and treatment efforts come to pass with remedial designs being no better than the flow and water quality data on which they are based.

The Watershed Approach at Big South Fork National River and Recreation Area Study Area Background

Contaminated mine drainage from historic coal mines, and methods to remediate these discharges are currently under study within the Big South Fork National River and Recreation Area (BISO), Oneida, Tennessee. The study area is a 12-mile segment of the Big South Fork of the Cumberland River located approximately 5 miles north of the State of Tennessee border (Figure 1). The region has been extensively mined for coal since the turn of the century with some mines still operating in the Big South Fork watershed. These mining activities created at least 120 underground entries within the BISO that are clustered along the various coal seam outcroppings in the steep slopes of the Big South Fork gorge. Many of the abandoned mine portals now discharge acidic-metal-laden waters into the Big South Fork. In addition, the waste materials from these mines were generally deposited in uncontrolled dumps near the mines (Muncy and Buckner, 1985) called gob piles. Many of the gob piles were pyrolized during the 1960's in an effort to reduce the quantity of acid-generating material in the mine wastes. The acidic, contaminated runoff from these sites has had a profound effect on the ambient water quality of the Big South Fork River. A summary of long-term U.S. Geological Survey water quality monitoring data collected within the study area at Blue Heron, Kentucky, reveals that many heavy metals frequently exceed EPA's acute criteria for the protection of freshwater aquatic life (Table 1).

Table 1. Summary of water quality parameters exceeding acute National Ambient Water Quality Criteria (NAWQC) at The Big South Fork Cumberland River, Blue Heron, Kentucky (1979-1993).

PARAMETER	TOTAL OBSERVATIONS	MEAN	NAWQC	No. OBSERVATIONS EXCEEDING NAWQC
pH (SI)	152	7.08	6.5-9.0	14 (Below 6.5)
Cadmium (ug/L)	53	5.7	3.9*	22
Copper (ug/L)	53	9.7	18*	8
Lead (ug/L)	53	49.4	82*	13
Zinc (ug/L)	53	21.0	120*	1

*Hardness-dependent Criteria. 100mg/L CaCO₃ used.

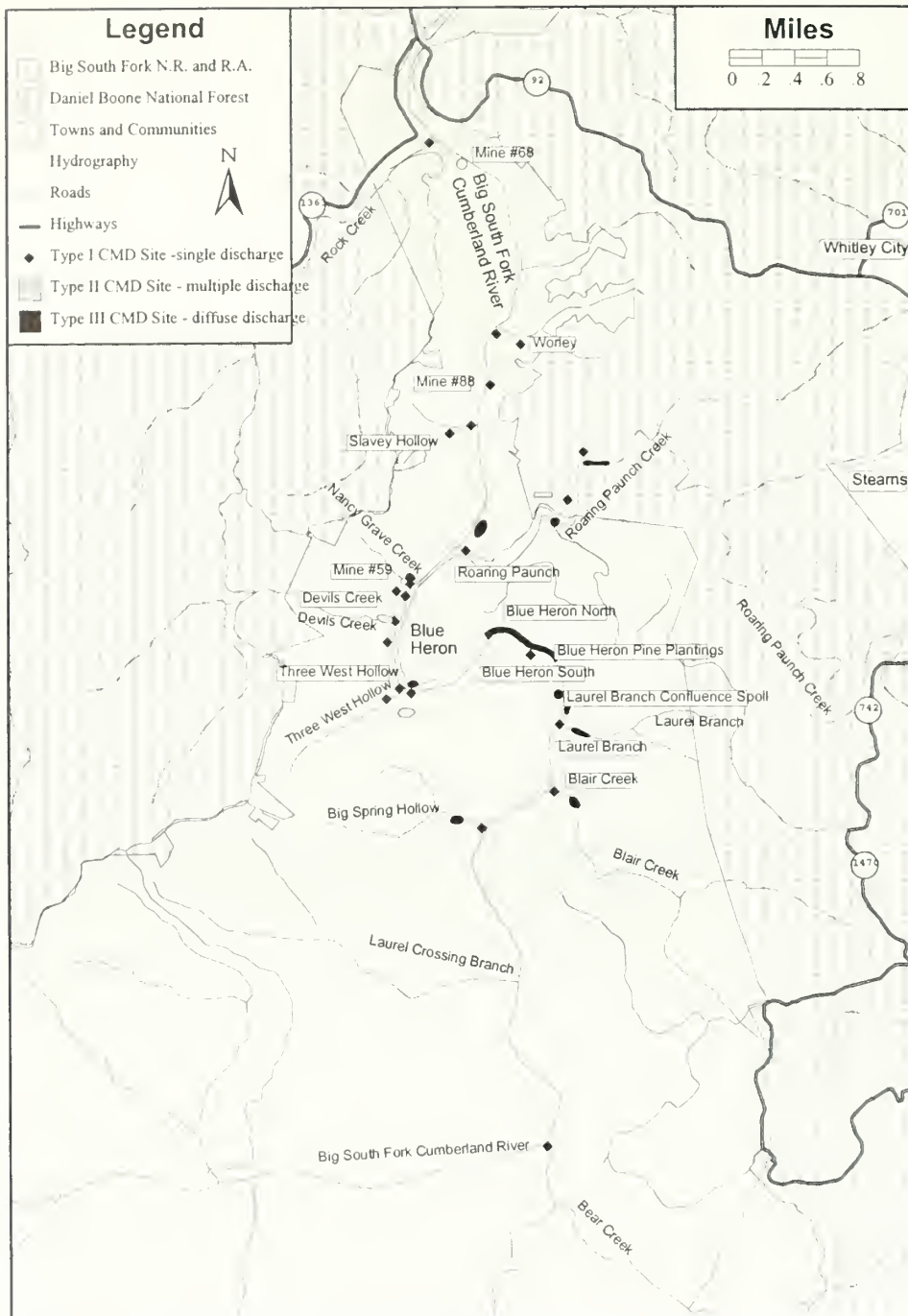


Figure 1. Big South Fork National River and Recreation Area Study Area and CMD Locations

Aquatic life in the river has been affected by the elevated concentrations of metals in the Big South Fork and possibly by metallic sediments in the river bed containing heavy metals and trace elements. Freshwater mussels have been especially affected, and many species are listed as threatened or endangered. Forty-five species of mussels were documented by surveys (Neel and Allen, 1964) at the beginning of the century while similar surveys completed in 1987 found only 22 species, most of which were found upstream of the study area. As few as 5 species were found in certain reaches of the 12-mile study area (Bakaletz, 1991). It is believed that the center of biological distribution of one mussel genus, *Epioblasma*, was in the Big South Fork because all 15 members of the genus were found in the river system (Johnson, 1978). Now only two members of the genus are found in the river system, and 10 members of the genus are extinct.

Phase 1 Site Prioritization

The purpose of this study is to inventory and georeference all CMD sites within the 12 mile study reach of the river and park within which the majority of past coal mining activities in the park occurred, to categorize all sites by discharge type and prioritize all sites according to direct impact to the river, and to make recommendations for best remediation methods for sites which are of high priority in improving the quality of the Big South Fork river. The National Park Service intends to initiate remediation of the most severe of the CMD discharges to the river based on the findings and recommendations of this study.

The study is being conducted using a phased watershed approach, with Phase I looking at site characterization and ranking of all sites, Phase II looking at setting the highest priority for those 15 highly-ranked sites from Phase I, and Phase III looking at an evaluation of feasible remedial options for the various types of CMD sites. Figure 1 shows the locations of individual CMD sites within the BISO study area and the type-classification of these sites for purposes of remediation. Type I sites contain a single discharge point releasing CMD to either an adjacent creek or the Big South Fork river. Type II sites contain multiple discrete discharges that could be combined for treatment. Type III sites contain a diffuse set of discharge locations, such as would exist along a broad seepage face of a mine spoil pile. A literature review of past mining practices and an investigation of the coal seam structure in the study area provided a preliminary indication of CMD source areas. A field reconnaissance program provided a rapid characterization of water quality at all CMD sites, data for assessment of remedial construction, and flow rates. CMD sites were scored based on loading of CMD constituents to the Big South Fork of the Cumberland River, suitability to passive remedial system construction or mine spoil reclamation, and distance criteria from the downstream boundary of the study area and to park improvements (Figure 2). Fifteen of the highest ranking sites were selected for study in Phase II of the project, including characterization of water quality and discharge across each site, monitoring of storm flush characteristics at each site, and re-evaluation of Phase I rank and priority (S.S. Papadopoulos and Associates, 1996). Phase III of the project will assess several remedial treatment options for mine drainage with characteristics as measured at each of the priority sites during Phase II. Approximately 80% of the CMD loading to the Big South Fork in the study area can be attributed to these sites.

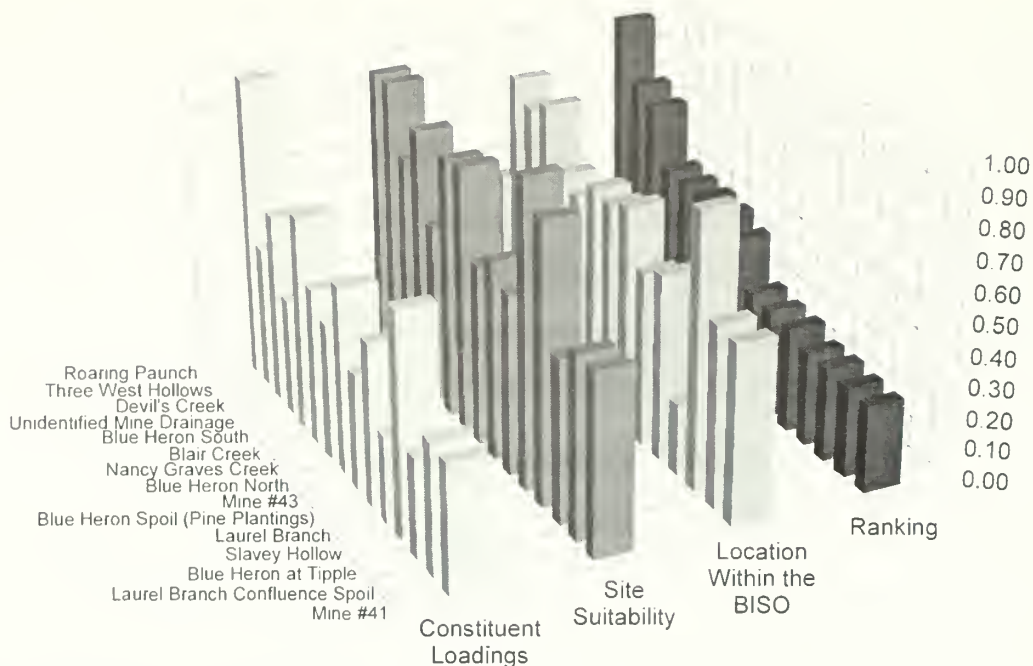


Figure 2. Ranking of CMD sites based on constituent loadings, remediation feasibility, and location.

Phase II

Phase II of the CMD site characterization is on-going with the final report expected in mid-1997. In this work, each of the CMD sites selected for further study will be re-evaluated for rank and priority. The re-evaluation will be based on a much more detailed understanding of seasonal loading to the Big South Fork, and aquatic toxicity in the river during high and low flow. A research study is on-going to assess the concentration of heavy metals and trace elements with known toxic effects in metallic sediments in the CMD from each of the priority sites. This information will be considered with the aquatic toxicity information to assessment total site toxicity in the river adjacent to each site. In addition, a study of stable isotopes of sulfur in the Blue Heron mine spoil seepage, in the Laurel Branch Confluence seepage, and in the Big South Fork has enabled a revision of the mass loading estimates for the spoil areas reported Phase I. The more accurate mass loading estimates will lead to a more accurate prioritization of CMD sites in Phase II. A study of stable isotopes of oxygen and hydrogen in the Blue Heron spoil seepage, and in the Laurel Branch Confluence spoil area, in the Big South Fork, and from discrete mine discharges has resulted in conclusions about the source of the water discharging from the spoil areas. The implications of these types of findings are significant in assessing the most effective remediation approach for the Blue Heron and Laurel Branch Confluence spoil areas to remove the supply of water to the interior of the mine spoil piles.

CONCLUSIONS

The primary goal of the watershed-based approach to CMD remediation is to identify sites that are the most responsible for the water-quality degradation of important water resources, thus

allowing the National Park Service to focus limited fiscal resources on remedial projects to optimize their effectiveness. Implementation of the approach employed on the Big South Fork has thus far been successful in achieving this goal. From an initial set of 120 sites that potentially discharge contaminated drainage to the Big South Fork, 15 have been identified that, if successfully remediated, will most improve the water quality of the river. Additional characterization of the CMD that will be completed in Phase II of the project will be utilized to determine if remediation is feasible, and alternative solutions to eliminating sources of water quality impairment will be examined.

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National Park Service Water Quality Data Archive Growing by “Bytes and Samples” as Baseline Water Quality Data Inventory and Analysis Project Progresses

by

Dean Tucker, Computer Programmer-Analyst

The National Park Service (NPS), Water Resources Division (WRD), in cooperation with the Servicewide Inventory and Monitoring Program, is producing Baseline Water Quality Data Inventory and Analysis Reports for all units of the National Park System with significant water resources. Drawing upon several Environmental Protection (EPA) national databases, most notably, STORET, the national water quality database, these reports provide parks with: (1) an inventory of all retrieved surface water quality parameter data, surface water quality stations, and the entities responsible for the data collection; (2) descriptive statistics and appropriate graphical plots of surface water quality data characterizing period-of-record, annual, and seasonal central tendencies and trends; (3) a comparison of the park's surface water quality data to relevant EPA and WRD water quality screening criteria; and (4) an evaluation of each park's data to determine what NPS-75 “Level I” water quality parameters have been measured within the park's study area. Accompanying each report are disks containing digital copies of all the data used in the report. To date, Baseline Water Quality Data Inventory and Analysis Reports have been completed for the 72 park units shown in Figure 1.



Figure 1 Parks With Completed Baseline Water Quality Data Inventory and Analysis Reports

STORET, the EPA's national water quality database, has been the focal point of the effort to produce Baseline Water Quality Data Inventory and Analysis Reports for parks. STORET contains a vast quantity of water quality data collected by more than 800 public (federal, state, and local) agencies throughout the 50 states, U.S. Territories, and portions of Canada. At present, STORET contains more than 225 million water quality observations from more than 825,000 unique sampling locations. The largest contributors of data to STORET are the U.S. Geological Survey (USGS), the EPA, and states. All water quality data collected by the USGS and entered in their WATSTORE/NWIS system are also uploaded to STORET.

The primary use of STORET, beyond serving as a national repository of shared water quality data, includes supporting several national and state programs governed by the Clean Water Act such as State 305(b) reports, National Pollutant Discharge Elimination System permits, and other water quality-related activities. Consultants and academics also make frequent use of STORET in preparation of environmental assessments, impact statements, and other work. By avoiding redundant collection of water quality data, government agencies can save significant resources. In fact, the Intergovernmental Task Force on Monitoring Water Quality is strongly encouraging government agencies to enter their water quality data into STORET so they can be accessed by other public and private organizations and permanently archived.

As the Baseline Water Quality Data Inventory and Analysis Project has progressed, WRD's use of STORET has moved beyond just being a "data retriever" to being an active "data archiver." For a park's Baseline Water Quality Data Inventory and Analysis Report to be comprehensive, it should include all surface water quality data collected in and around the park. At the outset of this project, it was noted that STORET contained a great deal of water quality data for national park units. With a few notable exceptions (e.g. Buffalo National River and Delaware Water Gap National Recreation Area to date), however, all the water quality data in STORET for national park units were collected by other government agencies - not the NPS or its contractors and cooperators.

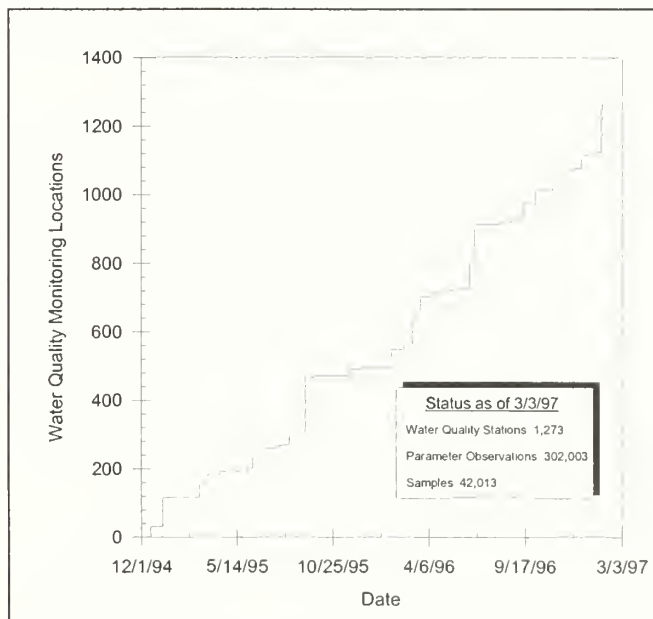


Figure 2 Increase in NPS Water Quality Data in STORET

When additional resources were made available to the project by the Servicewide Inventory and Monitoring Program, WRD initiated a concerted effort to increase the quantity of NPS collected and/or sponsored water quality data being uploaded to STORET. This effort has entailed contacting each park before initiating preparation of a park's Baseline Water Quality Data Inventory and Analysis Report and attempting to identify any surface water quality data that has been collected by the park or its contractors and cooperators. If previously collected water quality data (preferably in digital format) can be readily obtained, these data are quality assured and then uploaded to STORET. If key park water quality datasets only exist in analog (hardcopy) format, WRD has worked with the park to digitize the data so they can be archived in STORET. As a result of these efforts to date, 1,273 NPS monitoring stations have been created in STORET. These stations now contain the results of more than 300,000 water quality measurements from more than 42,000 samples (See Figure 2). As more parks participate in this effort and NPS formally adopts STORET as the archive for any NPS-funded water quality data collected in parks, the quantity of NPS data in STORET should increase dramatically.

The benefits of uploading and archiving park water quality data to STORET goes beyond ensuring that a park's Baseline Water Quality Data Inventory and Analysis Report is comprehensive to ensuring that the taxpayer's investment in collecting these water quality data is maximized. Often water quality data are collected for some "pressing" purpose and then simply left on a shelf, in a file cabinet, or on a computer's hard drive that becomes obsolete or worse, "crashes". As time passes, the individuals who collected the data move on and the data are, in essence, lost. No one else is able to use the data and the data are not available as a baseline against which to monitor change because the data were never adequately documented and archived. In archiving NPS water quality data in a publicly accessible archive, like STORET, NPS is preserving its investment in water quality monitoring, making the data readily available to other interested parties, and guaranteeing that historical data will be available as a baseline.

The Baseline Water Quality Data Inventory and Analysis Reports generated from the data in STORET are proving to be extremely useful to parks. The reports are being used in the Natural Resources Management Planning process (and the Water Resources Management Planning process) to identify and characterize issues related to water quality and long-term trends in water quality at parks. The Baseline Water Quality Data Inventory and Analysis Reports also identify critical gaps in park water quality information and provide a rational basis for future investment in water quality monitoring. By establishing STORET as a park water quality data repository, this effort is also creating a "living" park (and NPS national) water quality monitoring database.

How You Can Help Reclaim Old Water Quality Data

If you are aware of water quality data that has been collected in or near a national park unit and would like to assure that these data are permanently archived in STORET, please contact Dean Tucker with WRD at (970)-225-3516. If you would like to become an active user of STORET to archive your own data, you can also contact Dean Tucker or EPA STORET User Support (800) 424-9067. STORET is the EPA's largest and oldest data system. Currently, the STORET database resides on a mainframe computer in Research Triangle Park, North Carolina. Users can store and retrieve data by registering with STORET User Support, obtaining a User ID, and then logging into the mainframe. Unfortunately, as the STORET software and database architecture are old, interacting with the system is not recommended for novice computer users. The good news on this front, however, is that EPA has embarked on a modernization effort to redesign STORET to take advantage of modern user interfaces, database technologies, and distributed architectures. The new distributed STORET water quality database management system is expected to be operational in 1999. The new STORET will include PC-based software for allowing remote users to enter their own water quality data as well as access the entire national database.

For additional background on the "legacy" and modernized STORET database, visit EPA's STORET Web Site at: WWW.EPA.GOV/OWOW/STORET. If you would like to receive water quality data from STORET, you can submit a request to STORET User Support to retrieve water quality data from the database at: WWW.EPA.GOV/OWOW/STORET/RETRIEVAL.HTML.

Support Provided to Regions, Parks, and Other National Park Service Organizational Units

ALASKA REGION

ALASKA CLUSTER

Planning and Evaluation Branch



Gates of the Arctic National Park & Preserve

- * Provided assistance in preparation and approval of a task order for wetland mapping of the Kobuk River watershed.

Glacier Bay National Park & Preserve

- * Reviewed the proposed scope of work and priorities for commercial fisheries monitoring and to develop protocols for NPS monitoring of the harvest of Pacific salmon, Pacific halibut, and dungeness and tanner crabs.
- * Provided technical assistance in evaluating effects of a road that bisects a wetland.

Klondike Gold Rush National Historical Park

- * Reviewed and commented on the draft General Management Plan.

Water Operations Branch

Denali National Park and Preserve

- * Reviewed protocols for Long-Term Ecological Monitoring of riverine aquatic systems.
- * Provided advice related to lake monitoring protocols.
- * Provided technical assistance on final reports documenting effects of dust pallatives on park streams. Advised park on wetland treatment of metals versus potential releases during cold seasons.

Gates of the Arctic National Park and Preserve

- * Participated in the design of a surface and ground water monitoring program for the John River.
- * Reviewed potential impacts from development at Anaktuvuk Pass.

Katmai National Park and Preserve

- * Reviewed, commented, and eventually approved revised plan for WRD-funded oil contaminants project. Provided information on oil contaminants and protocols.

Klondike Gold Rush National Historical Park

- * Provided review comments on draft General Management Plan.
- * Arranged for an area hydrologist to conduct a feasibility study to control river bank erosion threatening cultural resources.
- * Provided technical comments on an internal review of the GMP and associated EIS.

Lake Clark National Park and Preserve

- * Reviewed study plan and other documents related to the proposed Johnson River Mine.

Wrangell - St. Elias National Park and Preserve

- * Provided review comments on draft final report for the WRD funded project related to the outburst flooding from Kennecott Glacier. (Report to be published as a USGS Water Resources Investigations Report.)

Water Rights Branch

Sitka National Historical Park

- * Evaluated issues related to NPS assertion of rights to protect the Indian River.

INTERMOUNTAIN REGION



Planning and Evaluation Branch

- * Reviewed the Colorado Division of Wildlife's "Assessment of Fishery Management Alternatives to Reduce the Impact of Whirling Disease in Colorado" and coordinated the NPS response with USFWS.

COLORADO PLATEAU CLUSTER

Planning and Evaluation Branch

Arches National Park/Canyonlands National Park/Natural Bridges National Monument

- * Assisted with the development of the Arches NP/Canyonlands NP/Natural Bridges NM Water Resources Scoping Report
- * Provided technical review and comments pertaining to the draft Environmental Impact Statement for the Atlas Uranium Mill reclamation project.
- * Assisted the parks with the development of a study plan for a Water Resources Management Plan.

Dinosaur National Monument

- * Provided technical review and comments on a project progress report entitled "Comparative Ecosystem Dynamics in Riparian Zones Along Regulated and Unregulated Rivers, the Green and Yampa."

Fossil Butte National Monument

- * Provided technical assistance with wetland delineation review, Clean Water Act and NPS Wetlands Guideline compliance, and preparation of a Section 404 permit application for the riparian restoration along Chicken Creek.

Glen Canyon National Recreation Area

- * Provided technical and policy review of a Cooperative Fishery Management Plan between NPS, Arizona Game & Fish Department, and Utah Division of Wildlife Resources.

- * Assisted the park with the development of a project statement for the synthesis of water quality data.

Water Operations Branch

Cluster-wide

- * Prepared review comments on Western Area Power Administration's Replacement Power EIS on potential effects to NPS park units in the Colorado River basin.
- * Participated on the Colorado River Management Work Group and represented NPS concerns in the Annual Operating Plan regarding habitat/beach-building flow criteria and surplus criteria.
- * Organized a meeting of seven Colorado River parks to discuss the hydrologic, geomorphic, and sediment transport responses of the Colorado River to an experimental flood release from Glen Canyon Dam.

Arches National Park

- * Provided extensive technical assistance on data interpretation, assessment of potential risk/injury, document review, and project design. Reviewed data from Arches headquarters drinking water.

Canyonlands National Park

- * Wrote software to QA/QC data collected by the park and uploaded to STORET by the State of Utah which detected the systematic error in all 1993 and 1994 data uploaded to STORET by the State of Utah statewide.
- * Analyzed spring water quality data obtained from the park and the State of Utah and prepared a technical report.
- * Provided technical assistance to the park related to the concern that pH in the Green River may be increasing, potential interactions between higher pH levels and organic inputs, and ammonia.

Chaco Culture National Historical Park

- * Authored detailed study plan for WRD funded erosion control project and served as park's representative in acquiring the services of a contractor to conduct the project.

Dinosaur National Monument

- * Participated in meeting of Flaming Gorge Working Group in Heber, UT.
- * Assisted site set up for Razorback Sucker spawning site monitoring.
- * Continued assistance in evaluating riparian area restoration project in Hog Canyon.
- * Prepared bidding documents, supervised construction, and tested new water supply well at Gates of Lodore.
- * Supported endangered fish research by establishing river stage survey control on a known Razorback Sucker spawning bar in the Green River for the purpose of hydrograph related habitat analysis.
- * Installed, maintained, and collected continuous stage data on the Green River at Gates of Lodore to assist a WRD funded sediment study.

El Malpais National Monument

- * Assessed feasibility of providing water for a highway reconstruction project.

Fossil Butte National Monument

- * Assisted in implementing the Chicken Creek restoration plan through plan preparation and review, instrumentation technology transfer, onsite assessments, data collection, interpretation and analysis, and in-house and interagency consultation.

Glen Canyon National Recreation Area

- * Reviewed and revised Glen Canyon Dam spike flow proposal and attended post spike flow sediment in Salt Lake City.
- * Provided recommendations for preparing public advisories for swimming beach closures.
- * Attended a meeting on Interagency Long-Term Monitoring and Research at Lake Powell and reviewed Memorandum of Understanding for cooperation and data sharing among agencies.
- * Attended interagency meetings to develop a strategic plan for addressing human health issues at Lake Powell and served on the Technical Advisory Committee tasked with developing bacteria water quality monitoring guidelines and protocols.

- * Provided technical assistance to the Park related to options for summarizing contaminants data and integrating it with other existing data.
- * Coordinated a WRD funded project and reviewed progress reports on the study of recovery of riparian communities following removal of livestock grazing.

Grand Canyon National Park

- * Reviewed USGS report on sand deposition from floods of the Little Colorado River.
- * Participated in flood planning meeting for Glen Canyon Dam in spring of 1996 and reviewed spike flow proposal for studying backwater rejuvenation and campsites.
- * Completed and distributed final report on daily photography of Grand Canyon sandbars.
- * Coauthored peer reviewed journal article on daily dynamics of sandbars.
- * Made reconnaissance of post spike flow effects on sandbars in Grand Canyon.
- * Coauthored peer reviewed journal article on statistical analysis of aerial photography of sandbar dynamics in Grand Canyon.
- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- * Reviewed and commented on proposal to develop a ground water supply for a new development south of Tusayan (Canyon Forest Village).

Mesa Verde National Park

- * Conducted a detailed survey and analysis to determine the source and possible remedies of groundwater discharge that was severely threatening prehistoric dwellings in the Cliff Palace area.

Pipe Spring National Monument

- * Assisted park with spring flow monitoring data by providing interpretation and analysis.
- * Provided assistance to park in applying for funding grant from the state of Arizona for the hydrologic investigation and conservation planning by preparing technical and interpretive materials.

Sunset Crater Volcano National Monument

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

Wupatki National Monument

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

Zion National Park

- * Developed detailed floodplain information for the North Fork of the Virgin River in the vicinity of Zion Lodge to assess existing flood hazard.
- * Performed design flood analysis for a proposed visitors center, parking lot, and road system adjacent to the North Fork of the Virgin River outside of the south entrance, in the vicinity of the Imax Theater.
- * Provided review comments and floodplain information for new transportation plan.
- * Assisted in development of information needed for road reconstruction following landslide into the North Fork Virgin River. Provided follow-up review of plans developed by consultant to FWHA.

Water Rights Branch

Canyonlands National Park

- * Assisted with preparation of water user's claims.

Capitol Reef National Park

- * Assisted with securing authorization for a water-supply well.
- * Conducted adjudication related studies.

Grand Canyon National Park

- * Continued South Rim spring monitoring program.
- * Conducted technical reviews of proposed settlement issues for Department of Justice (DoJ) for the Little Colorado River Adjudication.

- * Prepared statement of work and acquired services of USGS and contractor to prepare conceptual model and water budget for the regional ground-water flow system within the Little Colorado River adjudication area, participated in settlement discussions with Parties involved in the Little Colorado River adjudication, and initiated the establishment and facilitated meetings of the Little Colorado River Technical Study Group.

Hubbell Trading Post National Historical Site

- * Conducted field evaluation of park water developments and briefed park management on status of water rights claims in the Little Colorado River Adjudication.
- * Prepared statement of work and acquired services of USGS and contractor to prepare conceptual model and water budget for the regional ground-water flow system, participated in settlement discussions with Parties involved in the Little Colorado River adjudication, and initiated the establishment and facilitated meetings of the Little Colorado River Technical Study Group.

Mesa Verde National Park

- * Monitored progress of adjudication for Water Division 7.
- * Assisted legal counsel with revisions of draft decree and responded to questions from water users.

Petrified Forest National Park

- * Conducted field evaluation of park water developments, briefed park management on status of water right claims in the Little Colorado River adjudication, prepared statement of work and acquired services of USGS and contractor to prepare conceptual model and water budget for the regional ground-water flow system, participated in settlement discussions with Parties involved in the Little Colorado River adjudication, and initiated the establishment and facilitated meetings of the Little Colorado River Technical Study Group.

Pipe Spring National Monument

- * Assisted with request for information concerning the water use agreement between the National Park Service, local cattlemen, and the Kaibab Indian Tribe.

Sunset Crater Volcano National Monument

- * Conducted field evaluations of park water developments, briefed park management on the status of water right claims in the Little Colorado River adjudication, prepared

statement of work and acquired services of USGS and contractor to prepare conceptual model and water budget for the regional ground-water flow system, participated in settlement discussions with Parties involved in the Little Colorado River adjudication, and initiated the establishment and facilitated meetings of the Little Colorado River Technical Study Group.

Timpanagos Cave National Monument

- * Assisted in negotiations with the Utah State Engineer's Office to resolve reserved water right claims for the park.

Walnut Canyon National Monument

- * Cooperatively, with the city of Flagstaff, continued a crest-stage gaging program to determine level of high flows in Walnut Canyon National Monument.
- * Continued negotiations with the City of Flagstaff, Arizona to resolve reserved water right claims for the park.
- * Continued support to Department of Justice (DoJ) and Solicitor's Office (SOL) on Little Colorado River Adjudication settlement issues, and initiated the establishment and facilitated meetings of the Little Colorado River Technical Study Group.
- * Prepared final report on impacts of upstream reservoirs on riparian vegetation in Walnut Canyon.
- * Prepared an amended water rights claim for the Little Colorado River Adjudication.
- * Prepared a draft report assessing the quantities of water needed to fill and maintain pools on the valley floor.

Wupatki National Monument

- * Conducted field evaluation of park water resources, briefed park management on the status of water right claims in the Little Colorado River adjudication, prepared statement of work and acquired services of USGS and contractor to prepare conceptual model and water budget for the regional ground-water flow system, participated in settlement discussions with Parties involved in the Little Colorado River adjudication, and initiated the establishment and facilitated meetings of the Little Colorado River Technical Study Group.

Zion National Park

- * Conducted technical discussions with the state of Utah as part of negotiations to settle NPS reserved water right claims in Virgin River adjudication.
- * Assisted DoJ with presentation of settlement proposals to the State Engineer, Utah Attorney General's Office, and Washington County Water Conservation District regarding reserved water rights for the park.
- * Monitored Virgin River Basin water resource management issues, including participation in Southern Utah Planning Authorities Council and Virgin River Basin Federal Land Managers meetings.
- * Prepared simulations of hypothetical ground-water withdrawals on water sources for water-right negotiations.
- * Assisted DoJ in completing the settlement of water rights claims for the park.

ROCKY MOUNTAIN CLUSTER

Planning and Evaluation Branch

Bighorn Canyon National Recreation Area

- * Assisted park and a cooperator in the completion and publication of the Bighorn Canyon NRA Water Resources Management Plan.

Curecanti National Recreation Area

- * Assisted park in the completion and publication of the Curecanti NRA Water Resources Management Plan.

Glacier National Park

- * Advised park staff regarding wetlands compliance requirements for buried utility lines.

Grand Teton National Park

- * Advised park staff on hydrologic monitoring needed to guide gravel extraction and site reclamation on a terrace above Spread Creek (in cooperation with WOB).

John D. Rockefeller, Jr. Memorial Parkway

- * Designed a surface and ground water monitoring network and identified undisturbed wetland and upland "reference sites" for use in developing a restoration plan for the Snake River Gravel Pit (in cooperation with WOB).

Rocky Mountain National Park

- * Identified wetlands along the south shore of Lily Lake, provided assistance in preparation of a 404 permit application, and provided suggestions for "minimal impact" work to be performed in the area.
- * Provided assistance in preparation of a 404 permit application for the Fan Lake breach project.
- * Coordinated with the National Office of Trout Unlimited to seek an "Embrace-A-Stream" grant for cutthroat trout restoration.

Yellowstone National Park

- * Characterized the channel and floodplain of the Lamar River for use in calibrating a "Hydrogeomorphic" (HGM) model for riverine wetland functional assessment in the northern Rockies (in cooperation with WOB).
- * Provided technical review and comments to the park pertaining to wetland-related aspects of the New World Mine draft EIS.
- * Participated on the New World Mine assessment committee, providing technical assistance pertaining to wetlands delineation and evaluation of proposed mitigation sites.
- * Began initial discussions with the park on development of a wetland mitigation bank.

Water Operations Branch

Black Canyon of the Gunnison and Curecanti National Monument

- * Finalized time-lapse video tape of Gunnison River channel adjustments.
- * Reviewed draft Water Resources Management Plan.

Curecanti National Recreation Area

- * Uploaded park-collected water quality data (1987-1993) from threats-based monitoring program to STORET.
- * Provided advice regarding interpretation of the NPS Floodplain Guidelines in reference to an existing picnic site located in the floodplain of the Gunnison River.
- * Reviewed draft Water Resource Management Plan.
- * Analyzed water quality data obtained from the park and prepared a technical report.

Devils Tower National Monument

- * Established an alluvial groundwater monitoring program on the floodplain of the Belle Fourche River to collect data for use in developing a riparian restoration plan.

Glacier National Park

- * Provided analysis of National Pollutant Discharge Elimination System Regulations.
- * Provided park staff with requested information on pseudoreplication, hypothesis testing, and risk assessment.

Grand Teton National Park

- * Assisted in project to evaluate an existing groundwater monitoring program in the vicinity of sewage lagoons, conduct wellhead protection planning, and complete evaluation of trophic status of lakes.
- * Evaluated baseline hydrogeology for restoration of Snake River gravel pit.
- * Assisted park staff with developing backcountry water quality project and initial study plan and reviewed potential contractors who could conduct the project via cooperative agreement.
- * Provided information on biological effects of creosote and CCA treated wood.

Rocky Mountain National Park

- * Provided on-site advice during the controlled breach of Fan Lake moraine.

- * Assisted with an hydrologic analysis and provided recommendations for restoration of dredging impacts to the Colorado River by onsite inspection and video documentation and prepared a written report to the park and the Army Corps of Engineers.
- * Coordinated a WRD funded project for the restoration of Hidden Valley Creek to naturalize channel modifications by a ski area which closed several years ago.
- * Provided review comments on draft Environmental Assessment for breach of Fan Lake dam. Also, contributed technical advice related to the breaching operation.

Yellowstone National Park

- * Provided analysis of possible hydrogeologic impacts from the proposed New World Mine near Cooke City.
- * Reviewed fracture flow hydrogeologic studies and preliminary draft EIS.
- * Provided technical analysis and comment of acid-mine drainage issues on the New World Mine EIS.
- * Initiated, developed, and conducted a seminar in Fort Collins, attended by experts from academia and various government agencies, on water quality issues related to Soda Butte Creek. Summarized meeting notes and remaining questions/issues.
- * Assisted in multi-disciplined group involved in collecting reference data for use in HGM method of ranking wetland function.
- * Provided technical advice regarding adequacy of rip-rap and culvert design for road reconstruction project along Lake Yellowstone.

Water Rights Branch

Bent's Old Fort National Historic Site

- * Recommended actions in response to Division Engineer's compliance order.
- * Conducted field evaluation of water use requirements for well No. 4.

Big Hole National Battlefield

- * Assisted DoJ, SOL, Montana Water Court, and the park in preparing a Preliminary Decree for the Montana Statewide Water Rights Adjudication.

Bighorn Canyon National Recreation Area

- * Assisted with Resource Management Plan.
- * Assisted DoJ, SOL, Montana Water Court, and the park in preparing a Preliminary Decree for the Montana Statewide Water Rights Adjudication.

Black Canyon of the Gunnison National Monument

- * Assisted park and Region with negotiations for a contract with the Bureau of Reclamation for flow deliveries.
- * Conducted studies to quantify reserved water right.
- * Coordinated interim flow releases according to preliminary Aspinall Flow Delivery Contract.
- * Reviewed water rights aspect of proposed legislation redesignating the monument as a national park.

Curecanti National Recreation Area

- * Assisted with Water Resource Scoping Report.

Florissant Fossil Beds National Monument

- * Provided advice regarding reporting requirements for Temporary Water Supply Plan.
- * Assisted Region with information to respond to FOIA.
- * Coordinated NPS review of Draft Water Right Ruling.

Glacier National Park

- * Evaluated non-NPS water-right applications to implement the Montana Water Rights Compact.
- * Continued analysis of hydrologic data for use in hyphorheic organism study.
- * Assisted DoJ, SOL, Montana Water Court, and the park in preparing a preliminary decree for the Montana Water Rights Adjudication.

Grant-Kohrs Ranch National Historic Site

- * Monitored progress of Montana adjudication for Basin 76G.
- * Assisted park with protection of Little Cottonwood Creek riparian area.

Great Sand Dunes National Monument

- * Provided advice regarding acquisition of water rights for interdunal ponds.
- * Assisted DoJ, SOL, FWS, and park staff in developing technical strategy to prepare to respond to Stockman's proposed water development.
- * Reviewed "call" on Sand Creek prepared by GRSA and assisted in inspecting upstream impoundments.

Little Bighorn Battlefield National Monument

- * Assisted DoJ, SOL, Montana Water Court, and the park in preparing a Preliminary Decree for the Montana Statewide Water Rights Adjudication.

Rocky Mountain National Park

- * Reviewed water right filings prepared by park.
- * Reviewed hydrologic data and prepared draft completion report.
- * Reviewed proposal for study of effects of Grand Ditch on hydrology of Colorado River and associated wetlands.

Yellowstone National Park

- * Reviewed the preliminary draft Environmental Impact Statement for the proposed New World Mine and provided analysis of potential impacts to water rights from the proposed mine.
- * Evaluated non-NPS water right applications to implement the Montana Water Rights Compact.
- * Made presentations at the Soda Butte Creek Conference concerning the explanation of the water rights Compact and stream flow data collected for Soda Butte Creek.

- * Initiated investigations by the USGS and Montana Bureau of Mines to describe the hydrogeologic system of the Soda Butte Creek drainage upstream from the park boundary.
- * Assisted DoJ, SOL, Montana Water Court, and the park in preparing a preliminary decree for the Montana Water Rights Adjudication.
- * Assisted the state of Montana and the park in preparing rules for implementing the Yellowstone Controlled Ground Water Area.

Multi-Park

- * Reviewed monthly Colorado Water Court resumes.

SOUTHWEST CLUSTER

Planning and Evaluation Branch

- * Presented NPS wetland/floodplain compliance information and Corps of Engineers 404 permit information at two NEPA/106 compliance workshops.

Bandelier National Monument

- * Initiated revision of the park's Water Resources Management Plan.

Big Bend National Park

- * Provided technical assistance and oversight in the completion of the park's Water Resources Management Plan.

Carlsbad Caverns National Park

- * Provided assistance to DSC with NPS floodplain/wetland compliance and Corps of Engineers 404 permit information for water pipeline relocation.

Chickasaw National Recreation Area

- * Provided assistance to park staff in the initiation of a Water Resources Management Plan through the establishment of a Cooperative Agreement with Oklahoma State University.
- * Provided review and comment on the draft Strategic Plan for the park.

- * Assisted the park in evaluating funding mechanisms to investigate an unusually high occurrence of subcutaneous neoplasms in native gizzard shad at Lake of the Arbuckles.

Padre Island National Seashore

- * Advised park staff regarding wetlands compliance for wellhead plugging.

Pecos National Historical Park

- * Provided Superintendent and staff with a briefing on water-related issues and needs based upon the results of the newly completed Water Resources Management Plan.
- * Assisted park staff in preparing a project statement for a riparian restoration project on Glorieta Creek (in cooperation with WOB).

Saguaro National Park

- * Provided assistance with NPS wetlands/floodplain compliance and Clean Water Act compliance for a trails EA.
- * Assisted the park with the development of a water resources issues overview and scoping report.

Salinas Pueblo Missions National Monument

- * Assisted SWSO with the development and review of a proposal for the completion of a Water Resources Scoping Report.

Water Operations Branch

Amistad National Recreation Area

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

Bandelier National Monument

- * Uploaded park-collected water quality data (1977-1992) to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.
- * Uploaded water quality (1995-1996) collected at eight locations by Lynette Stevens as part of her Colorado State University Thesis "Comprehensive Benthic Macroinvertebrate Bioassessment Techniques As Indicators of Water Quality" and to establish post-fire and pre-development impacts.

- * Analyzed water quality data obtained from park and prepared a draft report. Data were uploaded into STORET for the I&M baseline water quality data analysis project.

Big Bend National Park

- * Provided digital geographic coverages from Baseline Water Quality Data Inventory and Analysis Report in ArcView-compatible format to SWSO GIS personnel.
- * Provided additional copies of Baseline Water Quality Data Inventory and Analysis Report diskettes to the park to transmit to Mexican states interested in border area water quality issues.
- * Provided recommendations for oil brine and produced water monitoring. Recommended Texas Fish and Wildlife Service expert for additional consultation.
- * Provided review comments for draft Water Resources Management Plan. Wrote a section for the plan on dealing with floodplain issues in the park.

Casa Grande Ruins National Monument

- * Helped initiate new project to assess impacts of water table declines.

Carlsbad Caverns National Park

- * Helped develop new project to investigate the hydrogeology of Rattlesnake Springs.
- * Provided fiscal and technical coordination for a WRD-funded project entitled "Determine Infiltration Rates."
- * Provided technical assistance review of the leaching of gender bending contaminants out of plastic water pipes.
- * Provided review comments and floodplain information for draft General Management Plan.

Chiricahua National Monument/Southern Arizona National Park Areas

- * Presented results of indirect flash-flood measurements and watershed analyses conducted on Bonita and Rhyolite Creeks at the First Conference on Research and Resource Management in Southern Arizona National Park Areas.

Guadalupe Mountain National Park

- * Recommended solutions to iron bacteria contamination of the water supply well at Pine Springs.

Lyndon B. Johnson National Historical Park

- * Supervised construction and tested new water supply well.

Montezuma Castle National Monument

- * Provided advice on repairing water supply well to eliminate potential contamination from surface water sources.

Organ Pipe Cactus National Monument

- * Evaluated the chemical hazard associated with five abandoned mine sites within the monument to determine the potential rating under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA).

Pecos National Historical Park

- * Assisted the park in setting up a spreadsheet for managing water quality data and doing graphical analysis.
- * Consulted with Oak Ridge expert before recommending that PECO consider becoming a stakeholder in mine-related environmental assessments upstream.

Petroglyph National Monument

- * Provided technical advice related to proposals to route storm water runoff through the park.
- * Provided hydrologic consultation on storm water drainage alternatives from proposed urban development upstream from park.

Saguaro National Park

- * Assisted in developing new project to evaluate the impact of declining water tables.

Salinas Pueblo Missions National Monument

- * Provided water quality data from STORET in support of water resource management planning effort.

White Sands National Monument

- * Advised new park staff on ground water quality studies and field training opportunities.

Water Rights Branch

Big Bend National Park

- * Authored the water rights section of the Water Resources Management Plan.
- * Proposed action plan to assess possible opportunities and limitations to improve stream flows in the Rio Grande River.
- * Assisted and participated in BIBE's applying Legal and Institutional Analysis Model to problem of instream flows in the park.

Carlsbad Caverns National Park

- * Commented on draft General Management Plan and assisted in assessing water supply options.

Chickasaw National Recreation Area

- * Drafted conceptual engineering design and initiated engineering documents to replace and plug Vendome well.
- * Participated in scoping meeting regarding Water Resources Management Plan.

Coronado National Memorial

- * Monitored progress of San Pedro River adjudication.
- * Reviewed water use and needs and assisted the DoJ with the preparation of abstracts, settlement language, and responses for status conferences with the Special Master in the Gila River Adjudication.

Fort Bowie National Historic Site

- * Monitored progress of Upper Gila River adjudication.
- * Continued negotiation for withdrawal of protests for water right filings for Apache and Mine Tunnel Springs.

Montezuma Castle National Monument

- * Monitored progress of Verde River adjudication.

Pecos National Historical Park

- * Assisted with Water Resources Management Plan scoping.
- * Assisted SOL and the Park in determining the water rights status of impoundments on Glorieta Creek.

Saguaro National Park

- * Monitored progress of San Pedro and Santa Cruz River adjudications.
- * Initiated review and established new water right records for newly acquired lands.
- * Reviewed water uses and needs, assisted DoJ with the preparation of abstracts, settlement language, and responses for status conferences with the Special Master in the Gila River Adjudication.

San Antonio Missions National Historical Park

- * Assisted SOL with plans to re-establish the San Juan Ditch Corporation.

Tonto National Monument

- * Monitored progress of Salt River adjudication.

Tuzigoot National Monument

- * Monitored progress of Verde River adjudication.

MIDWEST REGION

GREAT LAKES CLUSTER

Planning and Evaluation Branch



Indiana Dunes National Lakeshore

- * Reviewed and commented on GMP amendment/EA for the East Unit.

Sleeping Bear Dunes National Lakeshore

- * Initiated information gathering in support of the development of a Water Resources Scoping Report.
- * Coordinated acquisition of water quality data from the Platte Lake Improvement Association for use in the proposed Sleeping Bear Dunes National Lakeshore Water Resources Scoping Report.

Saint Croix National Scenic Riverway

- * Worked with park staff and fishery biologists of the Wisconsin and Minnesota DNRs to draft a Fishery Management Plan, provided technical assistance and policy guidance on habitat and fisheries management goals and objectives, assisted in the scoping of fisheries management issues for the St. Croix and Namakagon Rivers, and drafted goals and objectives for trout management.
- * Assisted park staff and a contractor in the development of a Water Resources Management Plan.

Water Operations Branch

Indiana Dunes National Lakeshore

- * Provided methods for plugging and abandoning monitor wells.
- * Reviewed and approved plan for WRD-funded bioassessment study of Grand Calumet Lagoon. Served as WRD project officer on the project.
- * Assisted BRD researchers in wetland restoration study by providing electronic recording equipment and with data collection, downloading, and management.

Isle Royale National Park

- * Reviewed and approved revised proposal for ISRO Water Quality Baseline Project: Enumeration of Plankton Samples. Served as WRD project officer on the project. Suggested options for contaminants monitoring.

Saint Croix National Scenic Riverway

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- * Reviewed and approved plan for WRD-funded study on the effects of cranberry operations. Served as WRD project officer on the project.
- * Provided review comments on draft General Management Plan.
- * Reviewed an interagency partnership study of erosion of islands heavily used by recreational boaters.

Sleeping Bear Dunes National Lakeshore

- * Uploaded park-collected water quality data (1990-1995) from 35 lakes and 21 streams throughout the park to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.
- * Uploaded water quality data collected by the Platte Lake Association to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

Water Rights Branch

Saint Croix National Scenic River

- * Reviewed draft Water Resources Management Plan

GREAT PLAINS CLUSTER

Planning and Evaluation Branch

Buffalo National River

- * Worked with the American Sportfishing Association to finalize a FishAmerica Grant application for a cooperative project between NPS and USFWS, Arkansas Game and Fish Commission, and the North Arkansas Fly Fishers to restore channel catfish to the Buffalo River.
- * Coordinated with the USFWS to obtain technical assistance from Mammoth Springs National Fish Hatchery.

Fort Union Trading Post National Historic Site

- * Continued to provide technical assistance with Clean Water Act compliance for a downstream irrigation intake with instream water diversion structures.

Theodore Roosevelt National Park

- * Initiated the cooperative development of the Theodore Roosevelt NP Water Resources Scoping Report utilizing an Interagency Agreement negotiated with the U.S. Environmental Protection Agency (Region VIII).

Wilson's Creek National Battlefield

- * Provided assistance with NPS wetland/floodplain compliance and Clean Water Act permit information.

Water Operations Branch

Buffalo National River

- * Review project proposals to inventory and delineate karst hydrogeology.
- * Reviewed and approved revised plan for continuation of WRD-funded bioassessment project and served as WRD project officer on the project.

Homestead National Monument of America

- * Provided consultation on soil loss monitoring at critical restoration sites by identifying evolving, but significant, erosion processes.
- * Prepared a report determining the threats to park resources caused by flooding and erosion through onsite inspection and compiling interagency watershed data and bridge design information.

Missouri National Recreational River

- * Provided comments and technical review of management alternatives and the water resources section of the draft GMP.

Niobrara National Scenic Riverway

- * Provided comments and technical review of management alternatives and the water resources section of the draft GMP.

Ozark National Scenic Riverways

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- * Reviewed USGS annual report of monitoring activities in contributing watersheds.

Pipestone National Monument

- * Provided recommendations for development of water quality monitoring program.

Theodore Roosevelt National Park

- * Uploaded park-collected water quality data from 17 sites in and around the park from an herbicide project and a domestic water supply project to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

Water Rights Branch

Niobrara National Scenic Riverway

- * Reviewed General Management Plan.

Scotts Bluff National Monument

- * Provided assistance to determine options for use or sale of water rights.

Agate Fossil Beds National Monument

- * Assisted SOL and park in responding to adjudication of a park water right.

NATIONAL CAPITAL REGION

Planning and Evaluation Branch

- * Advised Regional staff on wetland issues associated with a proposed land exchange with Georgetown University.

NATIONAL CAPITAL CLUSTER

Planning and Evaluation Branch



Antietam National Battlefield Park

- * Provided technical review of a WRD funded project to improve stream and riparian zone habitats associated with grazing impacts.

Catoctin Mountain Park

- * Provided technical assistance on trout stream sampling protocols for annual estimates of trout populations in Big Hunting Creek.
- * Evaluated the feasibility of incorporating a soon-to-be-abandoned sewage treatment pond into an improved stormwater routing and wetland detention/treatment system at Camp Round Meadow (in cooperation with WOB).

Constitution Gardens

- * Coordinated with the superintendent and staff at National Capital Parks-Central for NPS to host an interagency National Fishing Week Event involving over 600 children from the District of Columbia and nearby schools in Maryland and Virginia.

George Washington Memorial Parkway

- * Assisted with project design and preparation of a Task Order for an enhanced wetland mapping study for the park.

Rock Creek Park

- * Provided Division comments on the Project Agreement for Rock Creek GMP/EIS.

Water Operations Branch

Antietam National Battlefield

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

Catoctin Mountain Park

- * Assisted in the development of a proposal to reconstruct a obsolete sewage lagoon into a wetland. This wetland would be used to pre-treat storm water runoff and would be used for interpretive purposes also.

Chesapeake and Ohio Canal National Historical Park

- * Uploaded park-collected water quality data to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.
- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- * Provided a digital park boundary to the park's GIS Coordinator.
- * Made site inspection of damage caused by large flood to canal and towpath and provided technical advice regarding the best methods available to repair facilities such that future flood damage is minimized.

George Washington Memorial Parkway

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- * Reviewed progress reports for fat bag study of water contaminants and suggested improvements.

Manassas National Battlefield Park

- * Uploaded park-collected water quality to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

Prince William Forest Park

- * Developed project statement for post-reclamation water-quality monitoring of pyrite mine.

Wolf Trap Farm Park for the Performing Arts

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

NORTHEAST REGION

Planning and Evaluation Branch



- * Assisted with the review and revision of the New Jersey Shore of Delaware Bay Special Resource Study.

ALLEGHENY CLUSTER

Planning and Evaluation Branch

Allegheny Portage Railroad National Historical Site

- * Assisted DSC staff with wetlands compliance for reconstruction of a historic trail.

Fort Necessity National Battlefield

- * Assisted DSC staff with wetlands compliance for the visitor center.

New River Gorge National River

- * Assisted in the completion and publication of the New River Gorge NR, Gauley River NRA, and Bluestone NSR Water Resources Scoping Report.

Water Operations Branch

Cluster-wide

- * Represented the region at two meetings of the Mid-Atlantic Highlands Coordinating Council.
- * Provided review and recommendations on proposed changes to the Commonwealth of Pennsylvania antidegradation policy.

Bluestone National Scenic River

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

Friendship Hill National Historical Site

- * Provided technical review and comment on NRPP proposal for Refinement of New Acid Mine Drainage Treatment Technology.

Gauley River National Recreation Area

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases

New River Gorge National River

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- * Attended meeting to develop a collaborative water quality monitoring project as part of the NAWQA program.
- * Provided park with information on contaminants which should be monitored downstream of landfills.

CHESAPEAKE CLUSTER

Planning and Evaluation Branch

Colonial National Historical Park

- * Reviewed fisheries and aquatic management programs and provided recommendations for establishing a long-term fisheries inventory and monitoring program, the need to monitor recreational fishing, management of riparian zones, and specific studies for Chaetam Pond.

Delaware Water Gap National Recreation Area

- * Participated in meetings with New Jersey Division of Fish, Game and Wildlife and the Pennsylvania Fish and Boat Commission to discuss the development of an interagency Fishery Management Plan.
- * Provided assistance to the park for preparation of a wetlands wayside exhibit.

Fredericksberg & Spotsylvania County Battlefields Memorial NHP

- * Provided technical assistance in the design and conduct of a fisheries study in Milstead Pond.

Water Operations Branch

Assateague Island National Seashore

- * Coordinated a WRD funded project and made specific recommendations for instrumentation for baseline information and long-term monitoring by establishing tide gauges.

Colonial National Historical Park

- * Uploaded surface and ground water quality data collected by the Virginia Institute of Marine Science as part of a project entitled: "Determination of Ground Water Quality in Colonial National Historical Park Virginia at Locations Proximal to Urban and Agricultural Land Uses" to STORET.
- * Provided advice and software (ARCATLAS) to assist in the conversion of the park's GIS database from ATLAS*GIS to ArcView.
- * Reviewed draft final report for a WRD project to investigate water quality of the shallow ground water system and identify possible sources of contamination.
- * Provided technical review and comments on the Department of Defense Remedial Action Plan and Record of Decision for Site 12 at the Naval Weapons Station.
- * Provided recommendations on monitoring to assess potential impacts to park wetlands from stormwater runoff during the construction of the new York County Courthouse.
- * Responded to many technical assistance requests by analyzing reports and data generated by Navy contractors as well as draft responses from NPS.
- * Provided a related bibliography and a detailed review of a proposed erosion and sediment management system from the local state university.

Delaware Water Gap National Recreation Area

- * Oversaw contracted project designed to link a water quality/watershed model (Soil and Water Assessment Technique - SWAT) with GIS to enable the park and Delaware River Basin Commission to assess the impacts of rapid land development around the park on water quality.
- * Provided technical assistance information to park staff in the following areas: Study Designs, Pseudoreplication, Hypothesis Testing, Recommended Options for Biomonitoring and Habitat Classification Systems. Provided advice on contaminants which should be monitored at a flare disposal hazmat site.

George Washington Birthplace National Monument

- * Uploaded water quality data collected as part of the EPA's Chesapeake Bay Alliance Program to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

Petersburg National Battlefield

- * Uploaded park-collected water quality data from six sites on Poor and Harrison Creeks to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.
- * Provided technical assistance in response to several requests, including a detailed analysis of the meaning of oil data from a small creek impacted by a military motor pool.

Richmond National Battlefield

- * Provided technical assistance to park staff and SO in response to several requests: Recommended sampling and lab analyses strategies to park staff studying effects of a landfill, provided park staff with detailed information on mercury and other landfill contaminants. suggested protocols and personnel for field work, and analyzed some initial data provided by Chesterfield County related to the landfill.

Shenandoah National Park

- * Reviewed and commented on the Atmospheric and Streamwater Components of the Integrated Data Assessment Project of the Shenandoah Watershed Acidification Study.
- * Initiated wellhead protection planning for the Big Meadows area.
- * Provided advice on availability of groundwater for additional development at Loft Mountain.
- * Developed general design specifications and recommendations for channel stabilization of the Hogcamp Branch Creek in the vicinity of Big Meadows.

Valley Forge National Historical Park

- * Reviewed a USGS report on inorganic and organic chemical concentrations in sediments of the Schuylkill River and Myers Run and provided information on these chemicals.
- * Provided technical review and comment on a U.S. Geological Survey draft report, "Hydrogeology and Groundwater Quality of Valley Forge National Historic Park."
- * Provided technical review and comment on a U.S. Geological Survey draft report, "Metals, Pesticides, and Organic Industrial Compounds in Sediment at Valley Forge National Historic Site."

NEW ENGLAND/ADIRONDACK CLUSTER

Planning and Evaluation Branch

Acadia National Park

- * Provided technical assistance, technical review, and publication assistance in the completion of the Acadia National Park Water Resources Management Plan.

Cape Cod National Seashore

- * Assisted in the initiation and development of the Water Resources Management Plan.
- * Provided technical assistance and policy guidance regarding the development and authorization of commercial aquaculture operations and facilities in National Park Units.
- * Coordinated with the Director of the New England Aquarium and the American Zoo and Aquarium Association to evaluate the merits and possible environmental impacts of a project to rear tuna in net-pens.

Martin Van Buren National Historic Site

- * Assisted park management in the identification of wetlands-related management issues.

Minute Man National Historical Park

- * Provided information to park staff regarding design of boardwalks to minimize wildlife impacts.

Roosevelt-Vanderbilt Sites

- * Assisted park in the development of a Water Resources Scoping Report.

Saratoga National Historical Park

- * Assisted park in the development of a Water Resources Scoping Report.

Water Operations Branch

Acadia National Park

- * Provided fiscal and technical coordination for a WRD funded project entitled "Develop Long-Term Monitoring Protocols for Freshwater Resources."
- * Provided interpretation of the stormwater regulations for a construction project in Acadia National Park.
- * Provided guidance on mercury issues in helping the park develop a study plan for a mercury monitoring study.

Cape Cod National Seashore

- * Helped oversee continuing project to assess ecological impacts of groundwater withdrawals.
- * Helped initiate a new project to study eutrophication trends in the past 500 years in kettle pond sediments.
- * Participated in development of an aquifer management plan for the outer cape.
- * Assessed impacts of groundwater withdrawals by Provincetown from the North Truro Air Base.
- * Reviewed draft report, "Evaluation of Kettle Pond Hydrogeology," for a WRD-funded project to investigate the hydrogeology of kettle ponds.
- * Reviewed final reports and recommendations of the Lower Cape Water Management Task Force.
- * Advised Park on benzene monitoring: reviewed, provided comments, and approved mercury study plan; provided park with extensive information on PCBs; and provided park with requested information on pseudoreplication, hypothesis testing, and risk assessment.

Gateway National Recreation Area

- * Assisted the park in QA/QCing, digitizing, and standardizing water quality data (1977-1996) collected in the Jamaica Bay, Staten Island, Sandy Hook, and Atlantic Units in preparation for preparing a Baseline Water Quality Data Inventory and Analysis Report.

Martin Van Buren National Historic Site

- * Assessed bacteriological contamination of park's water supply well.

Minute Man National Historical Park

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

Roosevelt Campobello International Park

- * Participated in initial scoping of water resource issues.

Saratoga National Historical Park

- * Uploaded park-collected water quality data (1987-1990) from 17 sites in and around the park to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.
- * Addressed feasibility of constructing a new water supply well closer to headquarters and initial scoping of water resource issues.
- * Provided information on PCBs in soil, including information searched from new hard copy sources.

Multiple Parks

- * Provided digital boundaries for all the parks in the New York Bight area to the New England SO GIS coordinator.

Water Rights Branch

Cape Cod National Seashore

- * Initiated studies to address effects of groundwater withdrawals on aquatic resources.
- * Provided guidance on sale and lease of park water and water rights to park management.
- * Reviewed special use permit conditions proposed for delivery of ground water to Provincetown.

PACIFIC WEST REGION



COLUMBIA CASCADES CLUSTER

Planning and Evaluation Branch

- * Provided SO staff with NPS wetlands management and compliance training materials.

Lake Roosevelt National Recreation Area

- * Provided review and comment on draft Water Resources Scoping Report.

Olympic National Park

- * Coordinated with the National Office of Trout Unlimited to seek an "Embrace-A-Stream" grant for assessing spawning escapement of wild Soleduck summer coho salmon.
- * Assisted park staff in negotiations with Bureau of Indian Affairs (WASO) and SOL to prepare a response to the Chairman of the Washington Fish and Wildlife Commission regarding NPS involvement in fisheries management issues on the Queets River and Quinalt Tribal fisheries.

Oregon Caves National Monument

- * Provided technical support and review in support of the development of the GMP.

Water Operations Branch

City of Rocks National Reserve

- * Provided advice on location and probable hydrogeologic conditions for a new water supply well.

Crater Lake National Park

- * Provided technical assistance information and project oversight for a study of the effects of oil spilled into Crater Lake.

John Day Fossil Beds National Monument

- * Provided digitized boundary data to the park's GIS coordinator.
- * Uploaded park-collected water quality data to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

Mount Rainier National Park

- * Interpreted floodplain information for the new GMP.

North Cascades National Park Complex

- * Reviewed preliminary results of 2-D model for Stehekin River, made a site visit, and provided technical advice regarding the protection of eroding stream banks threatening a private road.
- * Discussed potential contaminants projects with park staff.

Olympic National Park

- * Calculated theoretical chlorine dose for Sol Duc Hot Springs.
- * Developed budget for water quality impacts of the Elwha River Ecosystem and Fisheries Restoration Project.
- * Assisted park in presenting information on sediment management alternatives at three public meetings on the Elwha Dam Removal EIS.
- * Provided consultation and review to the park regarding the potential removal of two dams on the Elwha River and provided a briefing to an ad hoc citizens group on the methods used in the EIS to evaluate sediment transport following dam removal.

Water Rights Branch

City of Rocks National Reserve

- * Assisted DoJ and SOL as requested for ongoing Snake River Basin adjudication.
- * Completed analysis of field data for Graham Creek.

Crater Lake National Park

- * Conducted Klamath adjudication-related studies.

- * Coordinated with SOL and DoJ, as well as technical specialists from other agencies, to ensure consistent claims for Federal water rights.
- * Assisted with technical evaluation of park water supply needs.
- * Provided advice regarding the availability of ground water and potential sites for production wells.
- * Prepared draft claims for Klamath adjudication.
- * Assisted in developing strategies for protecting the park's authorization to use water, specifically as it relates to water right priority.

Craters of the Moon National Monument

- * Assisted the DoJ in supporting NPS claims in the Snake River Basin adjudication.

San Juan Island National Historical Park

- * Continued implementation of action plan to protect water rights and water resources.
- * Assisted in responding to a developer's request and Congressional Inquiry regarding use of park waters.

PACIFIC/GREAT BASIN CLUSTER

Planning and Evaluation Branch

Death Valley National Park

- * Provided park staff with wetland management and compliance training materials.

Golden Gate National Recreation Area

- * Reviewed and commented on the preliminary design study for restoring tidal wetland habitat at Crissy Field.

Great Basin National Park

- * Developed a detailed study plan for and assisted in implementation of the project "Delineation and Mapping of High Visitor-Use Riparian Wetland Sites at Great Basin National Park."

Lake Mead National Recreation Area

- * Provided assistance to the park in evaluating a wetlands/riparian restoration project below Lake Las Vegas.
- * Provided assistance to the park in evaluating management options at the Overton Arms Springs riparian area for leopard frog habitat.

Joshua Tree National Park

- * Provided park staff with technical assistance relating to the Eagle Mountain Landfill Project including review and revision of the draft Standards of Significance for water resource impacts, the Draft EIS/EIR, and the draft Contract with Mine Reclamation Corporation.

Point Reyes National Seashore

- * Provided technical assistance on restoring tidal and freshwater wetlands at Lagunitas Creek.

Redwood National Park

- * Assisted park staff with interpretation of NPS wetlands guidelines and with procedures for delineating wetlands.
- * Provided technical assistance in the development and approval of the wetlands Statement of Findings for the Davison Ranch DCP.
- * Assisted park in evaluating the need for a Wetlands/Water Resources Management Plan.

San Francisco Maritime National Historical Park

- * Reviewed and commented on draft GMP/EIS.

Santa Monica Mountains National Recreation Area

- * Reviewed and commented on the "Draft Lower Zuma Creek and Lagoon Restoration Plan."

Yosemite National Park

- * Provided technical advice and guidance to the park and cooperator for the development of a Water Resources Management Plan.
- * Advised DSC staff regarding wetlands compliance for a bridge over the Merced River.

Whiskeytown-Shasta-Trinity National Recreation Area

- * Reviewed and commented on draft RMP.

Water Operations Branch

Channel Islands National Park

- * Provided technical guidance and interpretation of Clean Water Act regulations for the development of the Santa Rosa Island Resource Management Plan-Environmental Impact Statement that was developed to respond to a State of California Cleanup and Abatement Order for grazing activities.
- * Served as the park's technical representative at two meetings with the California Regional Water Quality Control Board and the Vail and Vickers Ranch, Inc. concerning NPS plans to comply with the cleanup and abatement order.
- * Assisted the Santa Rosa Island Water Quality Team with the development of grazing management alternatives for the Santa Rosa Island ES.
- * Provided review and comment on the draft Santa Rosa Island Resource Management Plan and EIS.
- * Provided assistance to park management and SOL in responding to a law suit filed by the National Parks Conservation Association over grazing on Santa Rosa Island.
- * Developed a briefing statement for the Associate Regional Director, Resource Management detailing WRD involvement with the Santa Rosa Issue.
- * Made a site visit to Santa Cruz Island and provided advice to park regarding the impacts associated with planned channel excavation.

Death Valley National Park

- * Developed a new project to monitor spring discharge at locations that may be vulnerable to impacts from groundwater withdrawals outside the park.

- * Reviewed and provided comments on draft USGS manuscript entitled “Chemistry of Selected Springs in Death Valley National Park.”
- * Initiated a detailed hydraulic analysis on Grapevine Creek in the immediate vicinity of Scottys Castle intended to protect the historic gate-house structure from intermediate magnitude floods.
- * Supplemented a topographic survey initiated by park staff to assess the effects of a major stream diversion that took place on Furnace Creek.

Golden Gate National Recreation Area

- * Provided review and comment on groundwater monitoring plan.
- * Answered a number of park staff questions on acephate (orthene), methamidophos, and lead and provided a review of Draft Report: "A Preliminary Design Plan for a Restored Tidal Wetland at Crissy Field."
- * Provided technical advice regarding stream rehabilitation in an urban environment.

Great Basin National Park

- * Assisted with the development of WRD funded program entitled “Delineation and Mapping of High Visitor Use Riparian and Wetland Sites.”
- * Conducted background research and provided onsite inspection and hydrologic consultation to the design engineer, construction contractor and park maintenance staff for rebuilding park's water supply.

Joshua Tree National Park

- * Coordinated WRD funded project of inventory and monitoring natural and historical water sources by providing technical data specifications and examples of similar projects.

Lake Mead National Recreation Area

- * Prepared presentation on water quality data management and uploading data to EPA’s STORET system for a Data Meeting sponsored by the Park.
- * Provided assessment of riparian hydrogeology and geomorphology in the Stewarts Point area.

- * Presented summary of WRD Water Quality Data Inventory Process to the Lake Mead Water Quality Data Workshop.
- * Reviewed USGS report which summarized NAWQA interagency work on synthetic organic compounds and effects on endocrine systems of carp in Lake Mead.
- * Recommended oil analyses and water quality monitoring options.
- * Traveled to Park to help review USGS/FWS reports, and interpret results for park management regarding potential mercury and other contaminants concerns.
- * Provided technical assistance on hydrology and erosion issues in meadows on the Shivwits Plateau.
- * Prepared technical data and graphics for publication on the effects of tamarisk removal on diurnal ground water fluctuations.

Redwoods National Park

- * Provided review comments on draft flood study for Prairie Creek near Davison Ranch.
- * Provided review comments on draft Environmental Assessment for Davison Ranch Development Concept Plan.

Santa Monica Mountains National Recreation Area

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- * Reviewed monitoring reports to evaluate possible groundwater impacts of subway tunnel construction beneath Runyon Canyon.
- * Developed design specifications for the Rocky Oaks Dam and spillway to improve the safety rating of the associated reservoir.
- * Advised park staff on numerous contaminants issues, including potential impacts of a landfill and studies necessary to make decisions about the landfill.
- * Reviewed a report concerning the hydrology and hydraulics of Zuma Creek where it passes under the Pacific Coast Highway.
- * Reviewed Environmental Assessment and provided information for the proposed modification of a hazardous dam.

Sequoia-Kings Canyon National Park

- * Uploaded park-collected water quality to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

Yosemite National Park

- * Reviewed final report from USGS on water supply alternatives for the Wawona area.
- * Reviewed Environmental Assessment for proposed partial removal of Mirror Lake Dam.
- * Provided advice and interpretation on Merced River and Mirror Lake restoration issues by preparing a draft technical report of a lake bed survey and historical river cross-section data.

Water Rights Branch

Death Valley National Park

- * Continued development of project and study plans to protect water rights.
- * Continued monitoring of Devil's Hole for detection of crustal movement and barometric pressure effects on water surface elevation.
- * Coordinated investigations with other entities at the fifth annual Devil's Hole workshop in Las Vegas, NV.
- * Monitored Devil's Hole pool level and discharge of Nevares, Texas, and Travertine springs.
- * Negotiated with Rayrock Mines, Inc. concerning its water right application upgradient from the park and reviewed proposed monitoring plan.
- * Completed agreement with Saga Exploration regarding its water right application.
- * Presented testimony at a hearing before the Nevada State Engineer regarding water-right applications at Rayrock Mining and reviewed and responded to State Engineer's ruling regarding Rayrock Mining's applications.
- * Protested two Nevada Water Right applications.
- * Recommended to the park that three applications not be protested.

- * Compiled and reviewed monitoring data on Department of Energy and Barrick Bullfrog water permits.
- * With USGS and park staff, analyzed potential causes for the apparent gradual decline of the pool level in Devil's Hole.
- * Prepared archive of hydrologic contractors work regarding the Las Vegas Valley Water District's water right applications.
- * Presented briefing to Superintendent concerning water right issues facing the park.
- * Reviewed water rights settlement regarding application of Project Darwin, Inc., for water rights from Darwin Wash.
- * Reviewed draft report concerning suitability of lands for Timbisha Tribe.

Golden Gate National Recreation Area

- * Compiled draft technical water rights assessment for the Presidio.
- * Assisted in negotiations with Muir Beach Community Services District concerning the District's Redwood Creek application.

Great Basin National Park

- * Continued analysis of seepage runs conducted by USGS on Baker, Lehman, and Snake Creeks.
- * Funded operation of gaging stations on Lehman and Baker Creeks.
- * Negotiated with Granite Peak Inc. regarding NPS protests to water applications in Snake Valley.
- * Reviewed EA for Cave Spring water system.
- * Provided guidance on sale and lease of NPS water or water rights.

Joshua Tree National Monument

- * Reviewed environmental impact documents for proposed Eagle Mountain landfill project located adjacent to park and evaluated impact to water-related resources and rights.

Lake Mead National Recreation Area

- * Withdrew NPS protests to applications by Bureau of Land Management and Mountain Mines.
- * Submitted annual report to Moapa Valley Water District regarding Rogers Spring as required by monitoring plan.
- * Provided additional funding and oversight for the investigation by Desert Research Institute of the origin and flowpaths of water issuing from selected springs.
- * Provided funding to monitor discharge of Rogers Spring.
- * Protested five water right applications.
- * Recommended that 16 applications not be protested.
- * Coordinated NPS review of State Engineer's ruling regarding Moapa Valley water District applications, and assisted legal counsel with a response.
- * Negotiated with Rivers End Sandoval Gravel regarding NPS protests to water applications.

Mojave National Preserve

- * Assisted with response concerning proposed ground water development and potential impacts to the park.

Point Reyes National Seashore

- * Assisted with Water Resources Management Plan.
- * Assisted with water right issues at Point Reyes Bird Observatory.
- * Coordinated state water-use compliance inspections and reporting requirements.
- * Prepared a draft summary of water rights and land ownership in Arroyo Hondo.
- * Reviewed Giacomini land exchange feasibility report for water right issues.
- * Provided review comments on State of California decision for Lagunitas Creek.

Santa Monica Mountains National Recreation Area

- * Reviewed water rights issues and assisted with Water Resources Management Plan.

Yosemite National Park

- * Prepared water rights assessments for El Portal and Yosemite Valley.

Multi-Park

- * Reviewed water right applications for Nevada and California.
- * Submitted Reports of Licensee for California parks.

PACIFIC ISLAND CLUSTER

Planning and Evaluation Branch

- * Assisted natural resources staff in the Pacific Island SO in evaluating projects for submittal to the FY97 WRD funding call.

Kalaupapa National Historic Park

- * Provided preliminary technical assistance regarding the monitoring of coral reef fish populations and fisheries.

Water Operations Branch

Hawaii Volcanoes National Park

- * Conducted background research and provided technical advice on high altitude parking lot runoff.

Kalaupapa National Historical Site

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- * Provided park, SO, and regional staff with recommendations for contaminants studies and actions related to leaking transformers, biological wastes, and other sources.

Kaloko-Honokohau National Historical Park

- * Negotiated with well drillers and USGS to complete the geohydrology project and provided recommendations to park, SO, and region regarding capable laboratories for sediment and tissue analyses.
- * Provided recommended protocols for monitoring metals and oil compounds and recommended labs to use and acceptable detection limits.

USS Arizona Memorial

- * Provided park with information on Fuel Oil 6, a product spilled there, as well as information on PAHs, alkyl PAHs, and recommended lab methods.

Water Rights Branch

Haleakala National Park

- * Assisted SO with water rights for Kipahulu well .

Kalaupapa National Historic Park

- * Continued the Waikolu Stream Study.
- * Prepared Interagency Agreements with USGS for stream gaging and cost sharing.
- * Contracted with Colorado State University for assistance with Waikolu Stream Study.
- * Reviewed and prepared comments on draft biologic reports.
- * Assisted park with response to groundwater pumping issue.

Kaloko-Honokohau National Historical Park

- * Continued a groundwater modeling study with USGS to determine effects of proposed groundwater withdrawals

SOUTHEAST REGION

Planning and Evaluation Branch



- * Reviewed and commented on Amendment 3 to the Fishery Management Plan for Coral, Coral Reefs, and Live/Hard Bottom Habitats of the South Atlantic Ocean.
- * Reviewed and commented on the Draft Management Plan/Environmental Impact Statement for the Florida Keys National Marine Sanctuary.

APPALACHIAN CLUSTER

Planning and Evaluation Branch

Big South Fork National River and National Recreation Area

- * Assisted park in evaluating proposal to take water from the reservoir at the downstream end of the park and pipe it across park lands.
- * Provided technical review and assistance to park and cooperators in support of the development of a Water Resources Management Plan.

Blue Ridge Parkway

- * Approved final project report entitled "Characterization and Monitoring of Southern Appalachian Bogs."

Great Smoky Mountains National Park

- * Reviewed and commented on the final draft of the Great Smoky Mountains National Park Fishery Management Plan.

Little River Canyon National Preserve

- * Provided review of project statements and field assistance in evaluating water resource issues facing the park.

Obed Wild and Scenic River

- * Assisted park in developing management objectives for water resources, providing an overview of water resources planning to TVA contractors and park staff, and providing review and comment on draft summary of results from WRMP Scoping Meeting.

Stones River National Battlefield

- * Reviewed and commented on the natural resource sections of the draft GMP.

Water Operations Branch

Big South Fork National River & National Recreation Area

- * Uploaded water quality data collected at 70 stations by SS Papadopoulos and Associates as part of an initial investigation into acid mine drainage impacts on the Big South Fork River to STORET.
- * With representatives of the Department of Energy and the park, served on an advisory board that is providing technical guidance and contract oversight for a NRPP funded study to characterize and remediate acid mine drainage in the park.
- * Reviewed and commented on Phase I report submitted by the prime contractor, S.S. Papadopoulos.
- * Reviewed monthly progress reports submitted by the S.S. Papadopoulos, Inc. and provided Email and oral feedback to the park on apparent problem areas.
- * Provided guidance on the development of Phase III performance goals for the removal of toxic metals.
- * Developed written briefing on the award process for the contract in response to a protest from the National Biological Service.
- * With park and S.S. Papadopoulos personnel, co-hosted a tour of BISO for the American Society of Surface Mining and Reclamation featuring the assessment process for acid-mine drainage in the park. Developed a tour briefing book distribution entitled "Risk-Based Watershed Approach to Characterizing Acid-Mine Drainage Impacts at Big South Fork National River and Recreation Area."
- * Provided fiscal and technical coordination for WRD funded project entitled "Initiation of a Monitoring Program for the Biotic Component of Aquatic Systems."
- * Reviewed and approved plan for aquatic biomonitoring project.

Blue Ridge Parkway

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- * Provided digital geographic coverages (including park boundary) from Baseline Water Quality Data Inventory and Analysis Report in Arc/Info-compatible format to park GIS Specialist.

Chickamauga and Chattanooga National Military Park

- * Attended meeting related to the Lookout Mountain oil/fuel spill and provided technical assistance advice on methods and strategies for monitoring oil compounds after the spill.

Great Smoky Mountains National Park

- * Provided technical advice related to the use of bio-engineering techniques of slope stabilization in road construction.

Little River Canyon National Preserve

- * Conducted site visit to review water quality needs and project proposals for developing a water quality monitoring plan.

Mammoth Cave National Park

- * Provided technical advice regarding the impacts associated with the proposed removal of a low-head dam on the Green River.

Obed Wild and Scenic River

- * Attended meeting to develop a collaborative monitoring project as part of the NAWQA program.

Water Rights Branch

Obed Wild and Scenic River/Big South Fork National River and Recreation Area

- * Reviewed report on public scoping for Water Resources Management Plan

ATLANTIC COAST CLUSTER

Planning and Evaluation Branch

Biscayne National Park

- * Responded to inquires from the American Sportfishing Association concerning NPS policies on development of artificial reefs and coordinated with biologists from the National Marine Fisheries Service, National Biological Service, State of Florida DEP, and the Atlantic States Marine Fisheries Commission.

Canaveral National Seashore

- * Provided technical and policy guidance regarding a proposal to develop commercial oyster farms within the park.

Congaree Swamp National Monument

- * Provided technical support and review in the completion of the park's Water Resources Management Plan.
- * Reviewed fisheries and aquatic biology programs and assessed recreational fishing activities and the need for additional fisheries management efforts and initiated discussions with research and management biologists at the South Carolina Department of Natural Resources regarding the development of cooperative projects.

Fort Caroline National Memorial

- * Assisted park in assessing causes and alternatives to resolve flooding issues in the vicinity of Spanish Pond.

Moore's Creek National Battlefield

- * Provided technical assistance regarding restoration and management of a drained savannah wetland and regarding erosion of a causeway adjacent to Moore's Creek.

Ocmulgee National Monument

- * Provided assistance to the park by reviewing numerous documents concerning the park's wetland and river resources and threats from roads, bridges, levees and developments and arranged for assistance from a local EPA wetland biologist to visit the park.

Timucuan Ecological and Historic Preserve

- * Completed the Timucuan Ecological and Historic Preserve Water Resources Management Plan.

Water Operations Branch

Canaveral National Seashore

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

- * Provided fiscal and technical coordination for WRD-funded project entitled "Determine Groundwater Flow Characteristics to Mosquito Lagoon."

Cape Hatteras National Seashore

- * Assisted in investigating potential for impacts to water quality in the shallow ground water system from septic field leachate.
- * Evaluated potential impacts of groundwater pumping from the Buxton Woods wellfield.

Cape Lookout National Seashore

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

Congaree Swamp National Monument

- * Attended a BEST program meeting in Fort Collins on behalf of the park, and then provided advice on the utility of the BEST program in helping define contaminants problems in the park.

Cumberland Island National Seashore

- * Uploaded water quality data to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

Fort Pulaski National Monument

- * Conducted site visit to review water quality issues and data for developing a comprehensive water quality and quantity monitoring program.

Kennesaw Mountain National Battlefield Park

- * Reviewed and commented on Small Parks Water Quality Monitoring report.

Moore's Creek National Battlefield

- * Provided technical advice related to eroding bank of stream near significant cultural resource in park.

Ocmulgee National Monument

- * Provided technical advice regarding construction of new interstate highway and levees in floodplain.

Timucuan Ecological & Historic Preserve

- * Reviewed and commented on Water Resources Management Plan.
- * Provided WRD project management and study plan review for Timucuan Preserve Study: "Comparative Evaluation of Physical and Biological Parameters."

Water Rights Branch

Cape Hatteras National Seashore

- * Coordinated (through East Carolina University and the Virginia Institute of Marine Science) studies to monitor/assess potential impacts of water withdrawals on island vegetation.
- * Provided funding for two gaging stations near Buxton.
- * Provided funding for vegetation and hydrologic studies.
- * Continued North Carolina State University investigation to describe spatial and temporal variation of water table.
- * Completed North Carolina State University investigation to determine hydraulic characteristics of surficial aquifer and reviewed associated report.
- * Participated in meeting between NPS, State of North Carolina, USGS, and Cape Hatteras Water Association scientists regarding water and vegetation resources.

GULF COAST CLUSTER

Planning and Evaluation Branch

Big Cypress National Preserve

- * Provided technical support and review in the completion and publication of a Water Resources Management Plan.

Everglades National Park

- * Provided comments on the draft "Environmental Assessment to Provide Additional Housing for the Miccosukee Tribe of Indians of Florida."
- * Drafted a wetland/floodplain Statement of Findings for the "Environmental Assessment to Provide Additional Housing for the Miccosukee Tribe of Indians of Florida," and concurred with final document.
- * Evaluated a proposal for restoring the "Hole in the Donut" area with respect to compliance with NPS floodplain management and wetlands protection guidance.
- * Assisted DSC staff regarding impacts of fire pump discharges on Taylor Slough.

Jean Lafitte National Historical Park & Preserve

- * Provided technical assistance to the park in obtaining information on exotic aquatic plant control and arranged for assistance from the Corps of Engineers Waterways Experiment Station.

Water Operations Branch

Big Cypress National Preserve

- * Uploaded seven years of water quality data from ongoing monitoring program to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.
- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

Big Thicket National Preserve

- * Uploaded park-collected water quality data (1984-1994) to STORET for 14 tributary stream sites in the Lower Neches River Basin, two sites along Menard Creek in the Trinity River Basin, and seven sites within the Lower Neches River Basin and generated statistical summaries for the park.
- * Assisted park staff with drafting a letter to EPA Region VI protesting amendments to the State of Texas's administrative code for the regulation of water quality in East Texas streams.

Biscayne National Park

- * Provided WRD project management and study plan review for study of potential impacts of flow regime changes on mangroves.

Everglades National Park

- * Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- * Provided Clean Water Act Compliance Review on the Draft Environmental Assessment to Provide Additional Housing for the Miccosukee Tribe of Indians of Florida.
- * Assisted in authoring a Statement of Findings for Floodplains and Wetlands related to the proposed construction of homes for the Miccosukee Tribe.

Gulf Islands National Seashore

- * Helped develop new project to investigate possible impacts of the park's septic leach fields on Santa Rosa Sound.
- * Evaluated potential for hydrologic impacts from treated sewage percolation ponds adjacent to the park.
- * Provided fiscal and technical coordination for WRD-funded project entitled "Assessment of Bacterial and Nutrient Pollution in Park Waters."
- * Provided technical and regulatory review and comments on a proposal to construct percolation ponds for the disposal of wastewater adjacent to the park.

Padre Islands National Seashore

- * Provided continuing technical assistance on oil contamination.
- * Reviewed and commented on Vantage Energy's remediation plan.
- * Provided assistance for the development of the conceptual process for the preparation of and Oil and Gas Management Plan and EIS for PAIS, LAMR, and BITH.
- * Responded to numerous technical assistance or review requests related to the park and developed and recommended lab and field protocols for collection of petroleum contaminated samples.

Virgin Islands National Park

- * Provided review and recommendations on revising the park's ongoing water quality monitoring program based on the park's Baseline Water Quality Data Inventory and Analysis Report.
- * Recommended revisions to the park's water quality monitoring program.

Water Rights Branch

Big Cypress National Preserve

- * Reviewed Water Resources Management Plan.

Natchez Trace Parkway and National Scenic Trail

- * Assisted the park with water rights information concerning a proposed lignite mine.

SERVICEWIDE

Planning and Evaluation Branch

- * Assisted with the development of the Water Resources Division's "*Themes for Water-Related Research and Resource Assessments*" prepared to provide guidance to other agencies supporting NPS efforts relating to water resources research.
- * Completed a draft of updated "*National Park Service Wetlands Protection Guidelines*."
- * Prepared a summary of FY96 funded fisheries and related projects and compiled a 20-year funding history of "*Living Aquatic Resource Management Programs*" for inclusion in the Annual Report to the National Recreational Fisheries Coordination Council.
- * Completed a final report of servicewide activities in support of National Fishing Week and distributed copies to Regional Directors, Superintendents of parks providing NFW activities, the National Fishing Week Steering Committee in Washington, D.C., and other federal agencies.
- * Provided technical review and comments on draft revisions of NPS-12 (NEPA) Guideline.
- * Provided technical review and comment on preliminary draft of the Scope and Content sections for the revised NPS-2 guideline.

- * Provided technical review of draft 36 CFR Part 3 regulations to amend NPS authority to regulate access of vessels recently operated in waters infested with injurious non-indigenous aquatic plants and animals.
- * Provided a technical review of the draft Aquaculture Health Protection, Trade, and Improvements Act of 1995 and coordinated NPS comments with those of USFWS to the Department of Agriculture.
- * Provided programmatic review and comment on draft NPS vision statements for the NPS Strategic Plan.
- * Provided technical review on the Federal Register notice for Federal Highways Administration procedures for mitigation of wetland impacts.
- * Provided technical review and comment on USFWS testimony on S1660, the National Invasive Species Act of 1966 for consistency with NPS program concerns.
- * Provided technical review and comment on the Federal Register notice for the five-year renewal of the Clean Water Act nationwide permits.
- * Provided coordination of fisheries and aquatic programs with U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Forest Service, and Bureau of Land Management at the national program level.
- * Developed a Memorandum of Understanding between the Division of Fish and Wildlife Management Assistance (FWS) and the Water Resources Division to provide for sharing technical expertise and providing technical assistance to parks.
- * Coordinated with USFWS in the development of the joint FWS/NMFS "Policy for Conserving Species Listed or Proposed for Listing Under the Endangered Species Act While Providing and Enhancing Recreational Fisheries Opportunities" and provided copies of the policy to all parks and regions.
- * Coordinated with State Fish Chiefs and Federal Agency Managers through participation in meetings of the Fisheries Administrator's Section of the American Fisheries Society and through partnership activities of the federally-chartered Sport Fishing and Boating Partnership Council.
- * Represented NPS on the National Fishing Week Steering Committee and assisted in the organization and planning the national program, and provided NPS liaison with all partner agencies at the National Kick-off Ceremony in Washington, D.C.

- * Worked with the Bureau of the Census to develop a nationwide reporting form for National Fishing Week events and activities that could be integrated into a unified data analysis system.
- * Coordinated an interagency Memorandum of Understanding with the American Zoo and Aquarium Association to foster native fish conservation.
- * Worked with the American Sportfishing Association, National Park Foundation, and Trout Unlimited to obtain external funding of NPS fisheries projects in the "Heritage Fisheries Restoration Program."
- * Coordinated with the National Office of Trout Unlimited to consider the use of "Embrace-A -Stream" grants Applications for fisheries restoration projects at Isle Royale National Park, Rocky Mountain National Park, and Olympic National Park.
- * Participated in an interagency Whirling Disease Workshop to review the status of whirling disease in North America, review the science and management options for dealing with disease outbreaks, and to begin to develop a strategy for dealing with the ecological, fisheries, and political consequences of the recent outbreaks of the disease in the Colorado and Madison Rivers.
- * Represented NPS on the interagency National Recreational Fishery Coordination Council chaired by Secretary Babbitt and Secretary of Commerce Kantor and worked with the Council to incorporate NPS programs, philosophies, and concerns into the National Recreational Fisheries Conservation Plan
- * Completed an updated Interagency Agreement between the National Park Service and the U.S. Fish and Wildlife Service for producing National Wetland Inventory maps and digital data for NPS units.
- * Served as hydrology group leader for a "Workshop on Hydrogeomorphic (HGM) Assessment of Wetland Functions in Northern Rocky Mountain Riverine and Depressional Wetlands."
- * Coordinated response to the WASO IPM program regarding use of deicers on park roads.
- * Prepared and taught wetlands management for the Natural Resources Fundamentals course (Albright Training Center).
- * Responded to an NRID request for information on NPS natural resource databases (provided content summary and sample printout from National Wetland Inventory database).

- * Served as NPS representative on the interagency Federal Geographic Data Committee - Wetlands Subcommittee.
- * Participated as a member of the Natural Resource Interpretation Committee for implementation of the Natural Resource Strategic Plan and developed an Action Plan for the Interpretation of Natural Resource Issues in the NPS.
- * Coordinated with Harper's Ferry and WASO Information Division regarding WRD assistance in developing interpretive exhibits pertaining to water resources.
- * Provided speaking points for presentation at Grand Canyon Interpreters/Natural Resource Managers Workshop.
- * Participated in meetings between DSC management and NRPC to discuss interactions between the two centers under the new NPS and DSC organizations.
- * Developed a Services Directory for WRD and the WRD components of a brochure describing the NRPC.

Water Operations Branch

- * Coordinated all aspects of the joint WRD - Servicewide Inventory and Monitoring Program's effort to produce Baseline Water Quality Data Inventory and Analysis Reports for all I&M parks.
- * Maintained and updated a geo-referenced park boundary digital database for use in GIS-based water resources analyses and queries; provided copies of this database to other WASO Divisions, as well as groups within the USGS, EPA, Census Bureau, and the private sector; and posted copies of the database on the NPS GIS Web Site to better service requests for the data.
- * Compiled and integrated a number of hydrographic-related digital databases into GIS format including: (1) the USGS Hydrologic-Climatic Data Network; (2) USGS Hydrologic Units; (3) USGS Water Quality Monitoring Station Locations; (4) USGS 7.5" quadrangle outlines; and (5) EPA/Corps of Engineers Water Impoundments.
- * Maintained software called IDEA which performs an Inventory Data Evaluation and Analysis for each Baseline Water Quality Data Inventory and Analysis Report comparing retrieved park water quality data against the Servicewide Inventory and Monitoring Program "Level I" water quality parameters to determine deficiencies.
- * Enhanced the TOSTORET software which converts DBASE III+ compatible .DBF files to EPA STORET format for uploading park water quality datasets to STORET.

- * Created software called LONGTERM to automatically identify water quality stations with longer periods-of-record, identify stations within and outside the park boundary, and perform other tasks in the preparation of Baseline Water Quality Data Inventory and Analysis Reports.
- * Created software called ARCATLAS to facilitate the conversion of GIS databases created in ATLAS to ArcView.
- * Provided review and comment on the Servicewide Inventory and Monitoring Program Data Management Plan.
- * Provided park bounding rectangles and centroids in GIS format to the Servicewide Inventory and Monitoring Program for use in the Dataset Catalog and other purposes.
- * Attended and made presentations at Servicewide Inventory and Monitoring Program's Steering Committee Meeting.
- * Represented NPS at the Fourth STORET Modernization Workshop hosted by the Environmental Protection Agency in Baltimore, MD.
- * Participated in a work group to develop a wellhead protection program in Wyoming.
- * Completed the first round of bibliographic database entries citing technical reference files, documents, books, and other media held in the Fort Collins WRD resource room. With the exception of non-bibliographic data files, this information collection is now accessible for bibliographic searching by WRD staff with Procite software.
- * With staff from the Bureau of Land Management, the U.S. Forest Service, and the State of Colorado Department of Health, instituted the Watershed Assessment Process by prioritizing watersheds by abandoned minelands that would be targeted for federal funds.
- * Provided advice on the development and presentation of an initiative to fund water quality work on NPS Abandoned Mineland Sites.
- * Provided review and comment on Office of Surface Mining Statement of Mutual Intent for Restoration and Protection of Streams and Watersheds for the Western Mine Restoration Partnership.
- * Provided review and comment on Office of the Solicitor's legal analysis entitled "Whether the Federal Land Manager is Required to Have a Permit Under the Clean Water Act for Abandoned Mining Operations on Federal Lands."

- * Prepared and presented a lecture entitled "Fundamentals of the Clean Water Act" to the resource management trainee course at Albright Training Center.
- * Provided review and comment on Department of Interior Draft Management Policies for Wild and Scenic Rivers.
- * Provided karst area management information to the State of Arizona.
- * Developed Government Performance Results Act tracking guidelines for recreational water quality.
- * Reviewed and commented on EPA's Hardrock Mining Framework Plan.
- * Provided guidance for the initiation of two pilot-level NAWQA program in New River National River and Recreation Area and Obed National River. Also continued to provide assistance to LAME for the completion of a study of contaminants and endocrine disruption at Las Vegas Wash and Bay. Also advised the park on a public relations program in preparation for the release of the results of the study.
- * Coordinated the development and implementation of demonstration water quality projects for the NAWQA program in parks. Participated in discussions with NPS and USGS staff, revised the list of parks within NAWQA study basins, selected parks for new and continuing projects, negotiated collaborative monitoring activities, deliverables and budgets, and reviewed progress reports submitted by USGS staff. Prepared NPS technical report containing a summary evaluation of the program to date. Prepared a NAWQA fact sheet for distribution by the NRID. Attended and gave presentations at various NAWQA study unit liaison committee meetings, and assisted other WRD staff prepare a budget initiative to support an expanded NPS-NAWQA partnership program.
- * Finished development of Volumes I, II, and III of the Park Service "Contaminants Encyclopedia" data base. Began process of choosing distribution media. Presented summary of the product to a meeting of NPS water specialists in Fort Collins. Finalized decision tree and other protocol guidance for how to monitor oil contamination as part of the revised encyclopedia.
- * Reviewed EPA draft groundwater contamination regulations for NPS.
- * Authored a chapter for the Federal Interagency Stream Restoration Handbook project and participated on the project steering committee.
- * Presented a session on Water Resources Inventory and Monitoring to the Servicewide Inventory and Monitoring Training Class.

- * Briefed the Office of Management and Budget on an NPS proposal and funding initiative to develop a Servicewide water quality monitoring program.
- * Assisted in coordinating servicewide Water/Aquatic Professionals meeting.
- * Participated on WRD's Reference Collection Committee by developing scope of collection statements, contractor librarian guidance, and periodic review of non-essential documents.
- * Provided interdivisional information to the Geologic Resources Division on developing their NPS expertise directory.
- * Provided email comments and examples on the NPS's Inventory and Monitoring project's draft bibliographic thesaurus.
- * Collected and maintained a CCMAIL mailing list of NPS water resource professionals and assisted in the maintenance of the Natural Resources BB.

Water Rights Branch

- * Updated water rights information contained in National Park Service's dockets.
- * Presented talk on "Water Rights and the National Park Service" at the Fundamentals for National Resources Management training course.
- * Assisted SOL with establishing an attorney position dedicated to assisting the National Park Service with water rights issues.
- * Participated in quarterly meetings with other federal agencies to coordinate water rights issues.



PUBLICATIONS 1996

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Water Operations Branch

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Brasher, Anne M. 1995. *Habitat Use by Fish ('o'opu), Shrimp ('opae) and Snails (hihiwai) in two streams on the island of Moloka'i: Waikolu Stream and Pelekunu Stream*. Draft Report. Cooperative National Parks Study Unit, University of Hawaii at Manoa. Prepared under National Park Service Cooperative Agreement CA 8006-2-9004.

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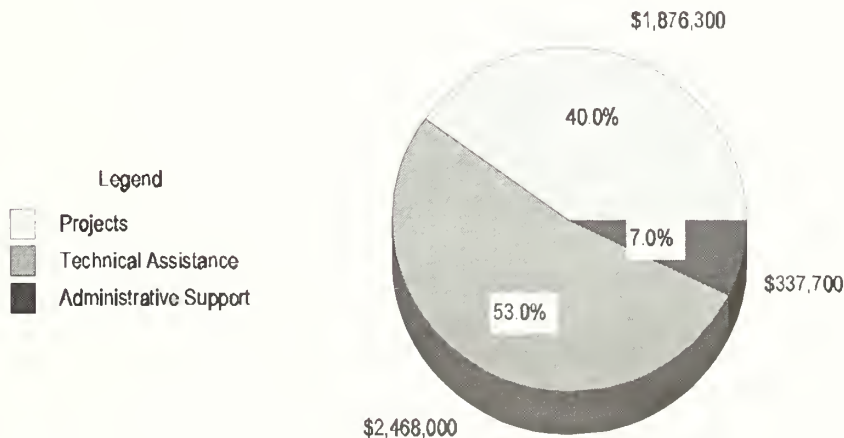
Financial Status of the Water Resources Division

By Dan B. Kimball
Division Chief

and Debi Cox
Program Analyst

FY97 base funding for the Water Resources Division (WRD) was \$4,682,000. The figure below illustrates the distribution of total WRD funds among technical assistance, project, and administrative support costs. Technical assistance, which is predominately day-to-day operational support to the parks includes staff salaries, travel, and associated expenses. Administrative support includes program management costs; administrative support, equipment, and supplies and materials Divisionwide. The projects category includes funds supporting WRD-sponsored projects in the areas of general water resources, water quality, wetlands protection, and water rights. Tables 1, 2, 3, and 4 list WRD-sponsored projects for FY97.

Distribution of WRD FY97 Funding



**TABLE 1 - FY97 WATERSHED PROTECTION PROGRAM FUNDING
WATER QUALITY ACTIVITY NEW AND CONTINUING PROJECTS**

PARK	FIELD AREA	NEW PROJECT TITLE	WRD PROJECT COORDINATOR	FUNDING \$(000s)	
				FY'97	FY'98
MACA	Southeast	Establish Water Quality Monitoring Program	Rosenlieb	25.00	25.00
GLCA	Intermountain	Protect Lake Powell Water Quality: Implement Strategic Plan with the Utah Department of Environmental Quality and the Risk Assessment Process	Long/Rosenlieb	24.10	25.00
CACO	Northeast	Eutrophication Trends in the Past 500 Years in Cape Cod Kettle Pond Sediments	Martin, L.	26.80	23.20
GRTE	Intermountain	Evaluate Ground Water Quality Data and Develop a Comprehensive Groundwater Quality Monitoring Plan	Long/Martin, L.	29.00	00.00
CAVE	Intermountain	Hydrogeology of Rattlesnake Springs	Martin, L./Martin, M.	15.00	00.00
SLBE	Midwest	Water Quality Monitoring/Lake Management	Vana-Miller	5.00	45.00
WICA	Midwest	Preserve and Restore Cave Resources/Study Petroleum Pollution	Benham	8.00	00.00
PRW1	National Capital	Post-Reclamation Water Quality of Cabin Branch Pyrite Mine	Rosenlieb	20.00	22.50
		SUBTOTAL NEW WATER QUALITY		152.90	140.70

TABLE 1 (Continued)

PARK	FIELD AREA	CONTINUING PROJECT TITLE	WRD PROJECT COORDINATOR	FUNDING \$(000s)	
				FY97	FY98
ACAD	Northeast	Develop Long-Term Monitoring Protocols for Freshwater Resources	Rosenlieb	12.25	00.00
GOGA	Pacific West	Establish a Water Quality Monitoring Program	Long	16.50	00.00
TIMU	Southeast	Comparative Evaluation of Physical and Biological Water Quality	Irwin	13.00	00.00
LACL	Alaska	Initiate Water Quality Assessment Program - Johnson River and Bear Creek	Long	19.50	00.00
GUIS	Southeast	Assessment of Bacterial and Nutrient Pollution in Park Waters	Rosenlieb	14.00	00.00
GRTE	Intermountain	Water Quality in the Backcountry	Long	11.00	00.00
		SUBTOTAL CONTINUING WATER QUALITY		86.25	00.00
		TOTAL WATER QUALITY ACT. NEW AND CONTINUING PROJECTS		239.15	140.70

**TABLE 2 - FY97 WATERSHED PROTECTION PROGRAM FUNDING
WETLANDS ACTIVITY NEW AND CONTINUING PROJECTS**

PARK	FIELD AREA	NEW PROJECT TITLE	WRD PROJECT COORDINATOR	FUNDING \$(000s)	
				FY97	FY98
PEFO	Intermountain	Puerco River Riparian Restoration Project	Wagner	20.00	20.00
DEWA	Northeast	Evaluate and Implement Wetland Restoration Methods	Krueger	24.00	20.00
GLCA CANY GRCA	Intermountain	Characterize and Identify Water Quality and Biotic Components in Isolated Springs along the Colorado River Drainage System, Utah and Arizona	Wagner/Rosenlieb	25.00	25.00
PECO	Intermountain	Develop Feasibility Study/Restoration Design for Glorieta Creek Floodplain/Reservoirs	Wagner/Smillie	30.00	00.00
OZAR	Midwest	Riparian Zone Wetland Characterization of Succession	Krueger	30.00	7.50
		SUBTOTAL WETLANDS NEW ACTIVITY		129.00	72.50

TABLE 2 (Continued)

PARK	FIELD AREA	CONTINUING PROJECT TITLE	WRD PROJECT COORDINATOR	FUNDING \$(000s)	
				FY96	FY97
GLCA	Intermountain	Wetland Inventory and Classification Using Multi-Spectral Videography	Krueger	20.00	00.00
COSW	Southeast	Wetland Database-Guided Field Verification of Vegetative Communities	Wagner	3.00	00.00
MORA	Pacific West	Inventory and Mapping of Park Wetlands	Krueger	20.00	00.00
GRBA	Pacific West	Delineation and Mapping of High Visitor-Use Riparian Wetland Sites	Wagner	20.90	00.00
INDU	Central	Ecological Assessment of the Grand Calumet Lagoons	Irwin	20.00	00.00
		SUBTOTAL CONTINUING WETLANDS PROJECTS		83.90	00.00
		TOTAL WETLANDS ACTIVITY NEW AND CONTINUING PROJECTS		212.90	72.50

**TABLE 3 - FY97 "OTHER" WATER-RELATED ISSUES
NEW AND CONTINUING PROJECTS**

PARK	FIELD AREA	NEW PROJECT TITLE	WRD PROJECT COORDINATOR	FUNDING \$(000s)	
				FY97	FY98
PISP	Intermountain	Provide for Water Resource Management; Conduct Hydrological Investigation	Inglis	50.00	00.00
NERI	Northeast	Water Resources Management Planning	Vana-Miller	50.00	00.00
SAGU	Intermountain	Inventory Water Sources and Riparian Areas	Benham/Martin, L.	30.90	19.10
VIIS	Southeast	Assess Soil Erosion/Sediment Input to Marine Environment	Inglis	36.00	14.00
CANY	Intermountain	Develop Water Resources Management Plan	Sharrow	20.00	30.00
ROCR	National Capital	Enhance/Create Vernal Pool Habitats in Rock Creek Park	Panek	7.50	7.50
SACR	Midwest	Development of Aquatic Habitat Assessment and Classification	Irwin/Panek	38.50	11.00
DEVA	Pacific West	Evaluate Localized Hydrology and Potential for Impacts on Spring Resources	Martin, L.	42.00	00.00
DENA	Alaska	Restoration of a Watershed Disturbed by Mining	Martin, M.	22.00	28.00
		SUBTOTAL NEW "OTHER"		296.90	109.60

TABLE 3 (Continued)

PARK	FIELD AREA	CONTINUING PROJECT TITLE	WRD PROJECT COORDINATOR	FUNDING \$(000s)	
				FY97	FY98
BUFF	Midwest	Inventory and Delineate Karst Hydrology	Martin, L.	25.00	00.00
ROMO	Intermountain	Restoration of Hidden Valley Creek	Inglis, Panek	15.00	00.00
CHCU	Intermountain	Implement Protection Against Erosion	Smillie	23.00	00.00
SACN	Midwest	Effects of Cranberry Agriculture Operations on River Health	Irwin	20.00	00.00
BISO	Southeast	Initiation of a Monitoring Program for the Biotic Component of Aquatic Systems	Rosenlieb, Irwin	50.00	00.00
		SUBTOTAL CONTINUING "OTHERS"		133.00	0.00
		TOTAL "OTHER" NEW AND CONTINUING PROJECTS		429.90	109.60

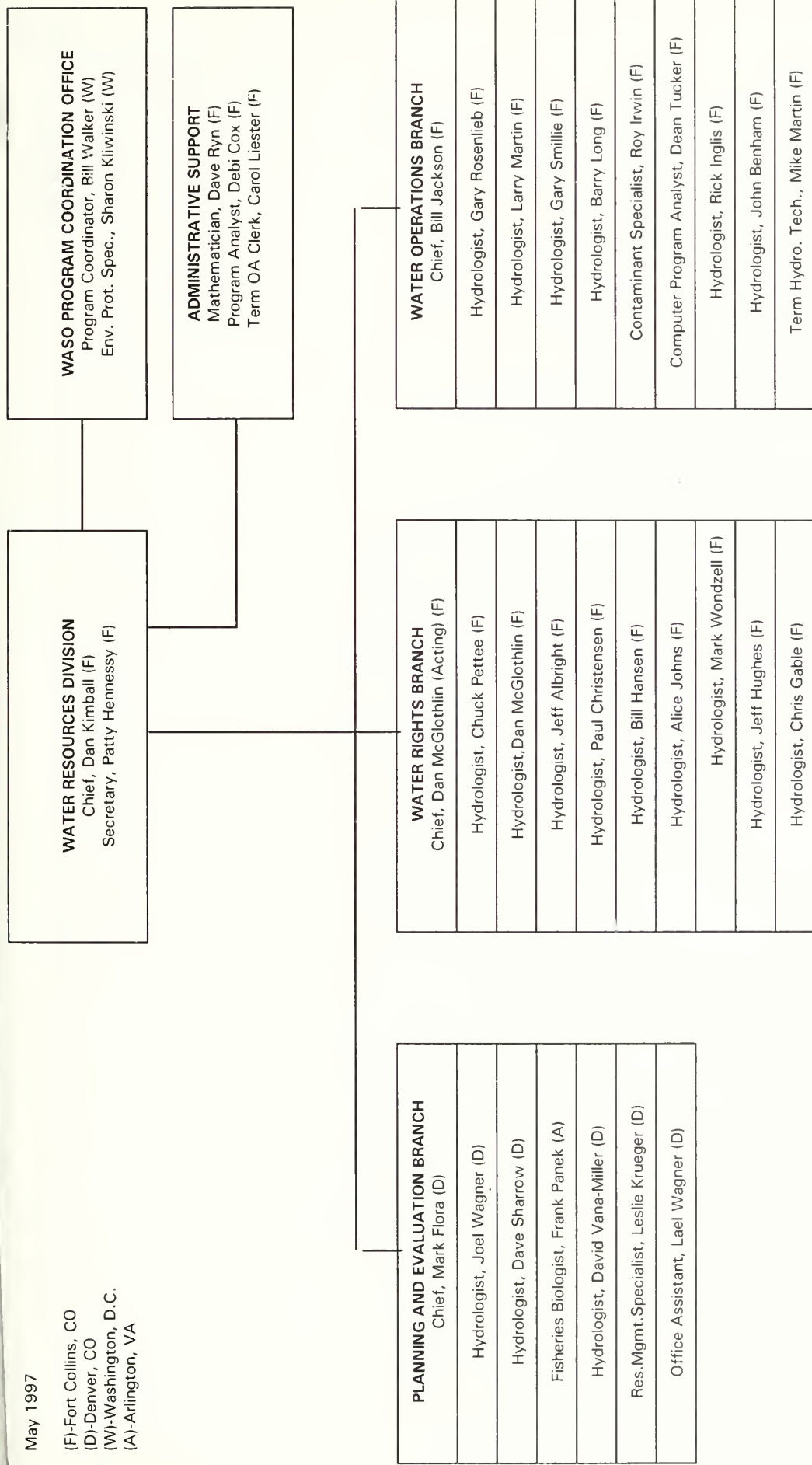
Summary of Water Rights Projects Supported by WRD Funds (Planned for Fiscal Year 1997)

PARK	FIELD AREA	PROJECT TITLE (s)	WRD PROJECT COORDINATOR	FUNDING \$(000)
ALL	ALL	Solicitor Position	Pettee	100.0
ALL	ALL	Water-Rights Docket Scanning	Albright	46.2
ALL	ALL	Expert Witness Training	McGlothlin	20.0
BEOL	IMFA	Water-Augmentation Plan	McGlothlin	1.5
BIBE	IMFA	Rio Grande Trend Analysis	McGlothlin	5.0
BLCA	IMFA	Preparation for Negotiation/Litigation	Wondzell	61.5
CACO	NEFA	Effects of Ground-Water Withdrawals	McGlothlin	31.4
CARE	IMFA	Preparation for Negotiation/Litigation	Albright	21.6
CHIC	IMFA	Engineering Design for Well	Christensen	5.0
CRLA	PWFA	Preparation for Litigation	Albright	84.5
DEVA	PWFA	Devil's Hole Monitoring and Statistics	Perfect	17.0
DEVA	PWFA	Evapotranspiration Study and Ground-Water Modeling	Johns/Perfect	99.1
AZ Parks	PWFA	Preparation for Negotiation/Litigation, Little Colorado River Adjudication	Hansen	88.0
GRCA	PWFA	South Rim Spring Flow Monitoring	Hansen	36.0
GRSA	IMFA	Preparation to File and Support Objections	Johns	10.0
KALA	PWFA	Hydrologic Investigation	Hughes	21.0
NV Parks	PWFA	Preparation for Administrative Hearings	Johns	34.4
MT Parks	IMFA	Preliminary Decree for Montana Compact	Pettee	11.8
YELL	IMFA	Stream Gaging and Ground Water Model	Gable/Christensen	46.9
ZION	IMFA	Implementation of water-rights settlement	Hansen	12.5
		TOTAL WATER RIGHTS PROGRAM		753.4

The National Park Service's water rights protection efforts are generally dictated by court schedules, Department of Justice case strategies, water development proposals by private entities, and State administrative actions and schedules. This table lists the allocation of funds necessary to meet these anticipated demands for FY97. If unforeseen hearing or adjudication needs arise, adjustments to project funding may be necessary.

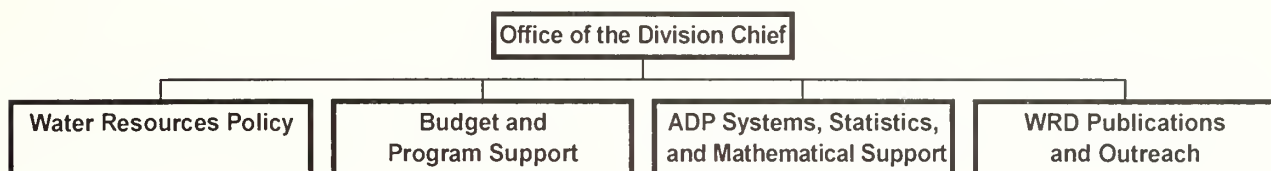
May 1997

(F)-Fort Collins, CO
(D)-Denver, CO
(W)-Washington, D.C.
(A)-Arlington, VA



OFFICE OF THE DIVISION CHIEF

Organization and Staff



Dan Kimball: Division Chief, MS in Water Resources Administration. Specialty areas include water and natural resources management planning and evaluation of complex regulatory issues.

Bill Walker: Water Resources Program Coordinator, PhD in Aquatic Ecology. Specialty areas include natural resources management and aquatic ecosystem management.

Sharon Kliwinski: Water Resources Washington Liaison, BS in Environmental and Pollution Sciences. Specialty area includes environmental legislation and regulations; natural resource policy issues; and mining laws, policies, and programs.

Dave Ryn: Mathematician, MS in Mathematics. Specialty areas include computer and statistical technology.

Debi Cox: Program Analyst, BA in Anthropology.

Patty Hennessy: Secretary, BBA in Management.

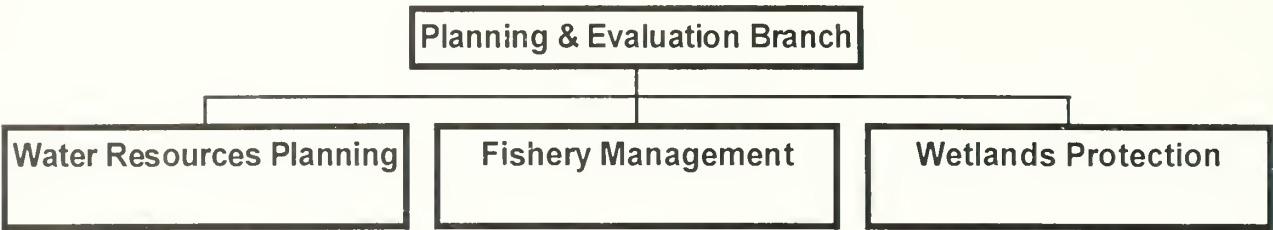
Chuck Cross: LAN Assistant, MBA in Management.

Carol Liester: Office Automation Clerk.

Peggy Dixon: Receptionist

PLANNING AND EVALUATION BRANCH

Organization and Staff



Mark Flora: Branch Chief. Hydrologist, MS in Environmental Science (Water Resources). Specialty areas include water resources management planning, water quality, and watershed management.

Joel Wagner: Wetlands Protection Program Team Leader, MS in Environmental Science (Water Resources). Specialty areas include wetlands delineation, hydrology, and regulatory issues.

Leslie Krueger: Natural Resource Specialist, BS in Water Resources. Specialty areas include wetlands science, management, and regulatory issues.

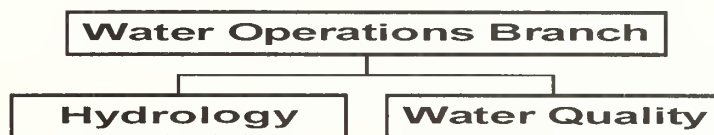
David Sharrow: Hydrologist, BS in Watershed Science. Specialty areas include water resources management planning, water quantity, and water quality.

Frank Panek: Fishery Management Program Team Leader, PhD in Fishery Biology. Specialty areas include aquatic and marine resources management, fish biology, and habitat condition assessment/mitigation.

David Vana-Miller: Water Resources Planning Program Team Leader, MS in Marine Biology. Specialty areas include water resources planning, aquatic and marine resources management, and water quality.

WATER OPERATIONS BRANCH

Organization and Staff



Bill Jackson: Branch Chief, PhD in Hydrology. Specialty areas include sedimentation processes, fluvial geomorphology, and river rehabilitation and management.

Gary Rosenlieb: Water Quality Program Team Leader, MS in Water Resources. Specialty areas include water quality (chemistry and micro-biology), groundwater quality, and hazardous materials management.

Gary Smillie: Hydrology Program Leader, Hydrologist/Hydraulic Engineer, MS in Civil Engineering. Specialty areas include flood-frequency analysis, open-channel hydraulics, floodplain management, and sediment transport.

Larry Martin: Hydrologist, MS in Hydrology. Specialty areas include ground water watershed management, riparian management, ground water modeling, GIS applications in water resources, and hydrologic data analysis.

Rick Inglis: Hydrologist, BS in Watershed Science. Specialty areas include field hydrologic data collection using automated recorders, watershed management, ground water monitoring, and data analysis.

Dean Tucker: Computer Programmer-Analyst, PhD in Forestry. Specialty areas include data management, computer graphics, and water resources applications in GIS.

Barry Long: Hydrologist, BS in Watershed Sciences, MS in Forest Hydrology. Specialty areas include physical-chemical aspects of water quality.

Jill Minter: Research Associate, MS in Watershed Sciences. Specialty area includes water quality inventory and monitoring and water quality data analysis.

Roy Irwin: Senior Contaminants Specialist, PhD in Biology. Specialist in environmental contaminants and biological aspects of water quality (including bio-monitoring).

Michael Martin: Hydrologist, BS in Environmental Geology, MS in Watershed Science. Specialty areas include geochemistry, water quality, geomorphology, flood analysis, and tropical aquaculture.

Brian Cluer: Grand Canyon National Park, Fluvial Geomorphologist, PhD Candidate in Earth Resources at Colorado State University, Duty-stationed with the Water Operations Branch.

John Benham: Hydrologist, BS in Geology, MS in Hydrology, Specialty areas include geohydrology, water quality, and contaminated area site characterizations (hydrology and water quality).

Alice Piotrowska: Secretary

STUDENT ASSISTANTS

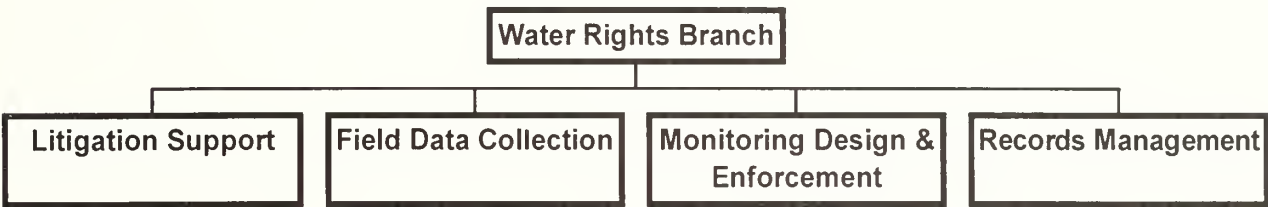
Scott Hermesen: Water Quality Technician, MS candidate in Analytical Chemistry (1995) & Environmental Engineering Division (1996). BS in Chemistry (1990).

Mark VanMouwerik: Assistant Contaminants Specialist/CSU Cooperative Agreement Student Assistant. MS (pending) in Environmental Health.

Elizabeth Eisenhauer: GIS specialist, MS candidate in Geology (1997), BS in Geology (1988).

WATER RIGHTS BRANCH

Organization and Staff



Chuck Pettee: Acting Branch Chief, Supervisory Hydrologist, Team Leader, MS in Watershed Science. Specialty areas include water rights, surface water hydrology and hazardous materials.

Dan McGlothlin: Supervisory Hydrologist, Team leader, BS in Watershed Hydrology. Specialty areas include water law, surface water hydrology, and upland watershed management.

Paul Christensen: Hydrologist, MS in Geology. Specialty areas include hydrogeology, ground water hydrology, and ground water modeling.

Bill Hansen: Hydrologist, MS in Hydrology. Specialty areas include water law, surface water hydrology, field methods, and watershed management and rehabilitation.

Alice Johns: Hydrologist, BS in Watershed Sciences. Specialty areas include water law, upland watershed management, fluvial geomorphology and field methods.

Jeff Albright: Hydrologist, MS in Watershed Management. Specialty areas include surface water hydrology, field methods, and instrumentation.

Jeff Hughes: Hydrologist, MS in Watershed Sciences. Specialty areas include surface water hydrology, field methods, and instrumentation.

Mark Wondzell: Hydrologist, MS in Agricultural Engineering. Specialty areas include surface water hydrology, riparian vegetation ecology/management, and field techniques.

Chris Gable: Hydrologist, BS in Watershed Sciences. Specialty areas include surface water hydrology, and water quality control.

Diana Perfect: Hydrologist, ME in Geologic Engineering. Specialty areas include hydrogeology, ground water hydrology, ground water modeling, dta analysis, GIS, and hydrochemistry.

Denise Newberry: Water Rights Specialist, MS in Natural Resources Management and Range Science. Specialty areas include NPS law enforcement, and natural resources policy and administration.

Gustavo Diaz: Research Associate; Colorado State University. PhD in Civil Engineering. Specialty areas include water resources and modeling.

Bernadette Berger: Research Associate; Colorado State University. BA in Speech Communications.

Lauren Hammack: Research Associate; Colorado State University. MS in Earth Sciences (Water Resources). Specialty areas include fluvial geomorphology, hydraulics, sediment transport, and computer modelling.

Brad Gillies: Student Hourly, Colorado State University.

Terry Knight: Student Hourly, Colorado State University.

Marion Ford: Secretary.

AWARDS

Office of the Division Chief

Dan Kimball received a plaque from the Superintendent of Yellowstone National Park recognizing his efforts in coordinating the technical support related to the New World Mine proposal.

Planning and Evaluation Branch

Mark Flora received a Certificate of Appreciation from the Superintendent, Colonial National Historical Park recognizing his efforts in the completion of the Colonial National Historical Park Water Resources Management Plan.

Joel Wagner received a Certificate of Appreciation from the Superintendent, Colonial National Historical Park recognizing his efforts in protecting the wetland resources of the park.

Frank Panek received an "On the Spot" performance award from the US Fish & Wildlife Service for his efforts at coordinating NPS-USFWS activities at the National Fishing Week Celebration in Washington, DC.

Leslie Krueger was certified as a Professional Wetland Scientist by the Society of Wetland Scientists; Leslie also received a plaque from the Superintendent of Yellowstone National Park recognizing her technical support efforts in assessing wetlands issues related to the New World Mine proposal.

Water Operations Branch

John Benham received a plaque from the Superintendent of Yellowstone National Park recognizing his technical support efforts in assessing water quality issues related to the New World Mine proposal.

Barry Long received an On-The-Spot Award for work associated with the demonstration NPS-NAWQA partnership water quality monitoring program in parks.

Mike Martin received an On-The-Spot Award for his work in analyzing a potentially serious ground water seepage condition at Mesa Verde National Park.

Gary Rosenlieb received a plaque from the Superintendent of Yellowstone National Park recognizing his technical support efforts in assessing water quality issues related to the New World Mine proposal.

Water Rights Branch

Jeff Albright received a Star Award for coordinating the efforts of several Federal agencies in developing technical hydrologic tools for the Klamath Basin adjudication in Oregon.

Bernadette Berger received a Certificate of Appreciation and Award for efforts in developing an electronic storage system for irreplaceable water-right records.

Paul Christensen received a Special Achievement Award from the Bureau of Land Management in recognition of his efforts and superior performance as technical lead on the interagency contract for hydrogeologic analysis and three-dimensional modeling of the carbonate-rock aquifer system in Nevada; Paul also received a Star Award for his efforts in initiating two cooperative investigations.

Chris Gable received a Star Award for her steadfast efforts to establish and operate a stream-gaging station at Yellowstone National Park as part of the implementation of the water-rights settlement with the State of Montana.

Lauren Hammack received a Certificate of Appreciation and Award for sediment transport investigations at Capitol Reef National Park and City of Rocks National Reserve and for the development of the WRB Rating Curve Policy Manual.

Bill Hansen received a Quality Step Increase for his efforts and leadership in developing and finalizing the water-rights agreement with the State of Utah for Zion National Park.

Andy Hautzinger received a Star Award for preparing graphical presentations used by NPS negotiators to communicate complex settlement concepts to the Secretary of the Interior and key Departmental staff as part of the water-rights settlement for Zion National Park.

Jeff Hughes received a Star Award for overcoming numerous obstacles to collect streamflow data at Kalaupapa National Historical Park.

Dan McGlothlin received a Star Award for his efforts in managing team resources and staff to respond to demands of the water-rights negotiation for Zion National Park.

Chuck Pettee received a Star Award for his efforts to apply the terms of the Montana water-rights compact to eliminate the threat of mining impacts to Yellowstone National Park without infringing on private property rights; Chuck also received a plaque recognizing his technical support efforts in assessing water quality issues related to the New World Mine proposal.

Owen Williams received the Department of the Interior's Meritorious Service Award in recognition of his outstanding contributions to the water rights program of the NPS and to the protection of water and water-related resources of units of the National Park system.

Appendix 1

Referenced Units of the National Park System

Acronym	Park Name	Region
ACAD	Acadia National Park	Northeast
AMIS	Amistad National Recreation Area	Intermountain
ARCH	Arches National Park	Intermountain
ASIS	Assateague Island National Seashore	Northeast
BAND	Bandelier National Monument	Intermountain
BEOL	Bent's Old Fort National Historical Site	Intermountain
BIBE	Big Bend National Park	Intermountain
BICA	Bighorn Canyon National Recreation Area	Intermountain
BICY	Big Cypress National Preserve	Southeast
BIHO	Big Hole National Battlefield	Pacific West
BISC	Biscayne National Park	Southeast
BISO	Big South Fork National River & Recreation Area	Southeast
BLCA	Black Canyon of the Gunnison National Monument	Intermountain
BLRI	Blue Ridge Parkway	Southeast
BRCA	Bryce Canyon National Park	Intermountain
BUFF	Buffalo National River	Intermountain
CAVE	Carlsbad Caverns National Park	Intermountain
CACO	Cape Cod National Seashore	Northeast
CAGR	Casa Grande National Monument	Intermountain
CAHA	Cape Hatteras National Seashore	Southeast
CAKR	Cape Krusenstern National Monument	Alaska
CANA	Canaveral National Seashore	Southeast
CANY	Canyonlands National Park	Intermountain
CARE	Capitol Reef National Park	Intermountain
CAVO	Capulin Volcano National Monument	Intermountain
CHAT	Chattahoochee River National Recreation Area	Southeast
CHCU	Chaco Culture National Historical Park	Intermountain
CHIC	Chickasaw National Recreation Area	Intermountain
CHIR	Chiricahua National Monument	Intermountain
CHIS	Channel Islands National Park	Pacific West
CHPI	Charles Pickney National Historical Site	Southeast
CIRO	City of Rocks National Reserve	Pacific West
COLM	Colorado National Monument	Intermountain
COLO	Colonial National Historical Park	Northeast
CORO	Coronado National Memorial	Intermountain
COSW	Congaree Swamp National Monument	Southeast
CRLA	Crater Lake National Park	Pacific West
CRMO	Craters of the Moon National Monument	Pacific West
CURE	Curecanti National Recreation Area	Intermountain
CUVA	Cuyahoga Valley National Recreation Area	Midwest
DENA	Denali National Park and Preserve	Alaska
DEVA	Death Valley National Monument	Pacific West
DEWA	Delaware Water Gap National Recreation Area	Northeast

DINO	Dinosaur National Monument	Intermountain
EBLA	Ebey's Landing National Historic Reserve	Pacific West
ELIS	Ellis Island	Northeast
ELMO	El Morro National Monument	Intermountain
EVER	Everglades National Park	Southeast
FIIS	Fire Island National Seashore	Northeast
FLFO	Florissant Fossil Beds National Monument	Intermountain
FOBO	Fort Bowie National Historical Site	Intermountain
FOBU	Fossil Butte National Monument	Intermountain
FOCL	Fort Clatsop National Memorial	Pacific West
FOLS	Fort Larned National Historical Site	Midwest
FONE	Fort Necessity National Battlefield	Northeast
FOSC	Fort Scott National Historical Site	Midwest
FRHI	Friendship Hill National Historical Site	Northeast
GATE	Gateway National Recreation Area	Northeast
GETT	Gettysburg National Military Park	Northeast
GLAC	Glacier National Park	Intermountain
GLCA	Glen Canyon National Recreation Area	Intermountain
GOGA	Golden Gate National Recreation Area	Pacific West
GOSP	Golden Spike National Historical Site	Intermountain
GRBA	Great Basin National Park	Pacific West
GRCA	Grand Canyon National Park	Intermountain
GREE	Greenbelt Park	National Capital
GRKO	Grant-Kohrs Ranch National Historical Site	Intermountain
GRPO	Grand Portage National Monument	Midwest
GRSA	Great Sand Dunes National Monument	Intermountain
GRSM	Great Smoky Mountains National Park	Southeast
GRTE	Grand Teton National Park	Intermountain
GUIS	Gulf Islands National Seashore	Southeast
GUMO	Guadalupe Mountains National Park	Intermountain
GWCA	George Washington Carver National Monument	Midwest
GWMP	George Washington Memorial Parkway	National Capital
HAFO	Hagerman Fossil Beds National Monument	Pacific West
HALE	Haleakala National Park	Pacific West
HAVO	Hawaii Volcanoes National Park	Pacific West
HEHO	Herbert Hoover National Historical Site	Midwest
HOSP	Hot Springs National Park	Midwest
HUTR	Hubbell Trading Post National Historical Site	Intermountain
INDU	Indiana Dunes National Lakeshore	Midwest
ISRO	Isle Royale National Park	Midwest
JECA	Jewel Cave National Monument	Intermountain
JELA	Jean Lafitte National Historical Park & Preserve	Southeast
JOTR	Joshua Tree National Monument	Pacific West
KAHO	Kaloko-Honokohau National Historical Park	Pacific West
KALA	Kalaupapa National Historical Park	Pacific West
KATM	Katmai National Park and Preserve	Alaska
KEMO	Kennesaw Mountain National Battlefield Park	Southeast
KNRI	Knife River Indian Village National HS	Midwest
LACH	Lake Chelan National Recreation Area	Pacific West

LACL	Lake Clark National Park and Preserve	Alaska
LAME	Lake Mead National Recreation Area	Pacific West
LARO	Lake Roosevelt National Recreation Area	Pacific West
LIBI	Little Bighorn Battlefield National Monument	Intermountain
LYJO	Lyndon B. Johnson National Historical Park	Intermountain
MACA	Mammoth Cave National Park	Southeast
MANA	Manassas National Battlefield Park	National Capital
MANZ	Manzanar National Historical Site	Pacific West
MEVE	Mesa Verde National Park	Intermountain
MIMA	Minute Man National Historical Park	Northeast
MNRR	Missouri National Recreation River	Midwest
MOCA	Montezuma Castle National Monument	Intermountain
MORA	Mount Rainier National Park	Pacific West
MORR	Morristown National Historical Park	Northeast
MRCC	Mississippi River Corridor Heritage Comm.	Midwest
NABR	Natural Bridges National Monument	Intermountain
NACE	National Capital Parks - East	National Capital
NASA	National Park of American Samoa	Pacific West
NATR	Natchez Trace Parkway	Southeast
NCFA	National Capital Field Area	National Capital
NERI	New River Gorge National River	Northeast
NIMI	Niobrara-Missouri National Riverways	Midwest
NOCA	North Cascades National Park	Pacific West
OBRI	Obed Wild and Scenic Riverways	Southeast
OLYM	Olympic National Park	Pacific West
ORPI	Organ Pipe Cactus National Monument	Intermountain
OZAR	Ozark National Scenic Riverways	Midwest
PAIS	Padre Island National Seashore	Intermountain
PECO	Pecos National Historical Park	Intermountain
PEFO	Petrified Forest National Park	Intermountain
PETR	Petroglyph National Monument	Intermountain
PIRO	Pictured Rocks National Lakeshore	Midwest
PISP	Pipe Spring National Monument	Intermountain
PORE	Point Reyes National Seashore	Pacific West
PRWI	Prince William Forest Park	National Capital
PUHE	Puukohola Heiau National Historical Site	Pacific West
PUHO	Pu'uhonau O Honaunau National Historical Park	Pacific West
REDW	Redwood National Park	Pacific West
RICH	Richmond National Battlefield Park	Northeast
ROCR	Rock Creek Park	National Capital
ROMO	Rocky Mountain National Park	Intermountain
RUCA	Russell Cave National Monument	Southeast
SAAN	San Antonio Missions National Historical Park	Intermountain
SACN	Saint Croix National Scenic Riverway	Midwest
SAGA	Saint-Gaudens National Historical Park	Northeast
SAGU	Saguaro National Monument	Intermountain
SAIR	Saugus Iron Works National Historical Site	Northeast
SAJH	San Juan Island National Historical Park	Pacific West
SAMO	Santa Monica Mountains National Recreation Area	Pacific West

SARA	Saratoga National Historical Park	Northeast
SCBL	Scotts Bluff National Monument	Midwest
SEKI	Sequoia and Kings Canyon National Park	Pacific West
SHEN	Shenandoah National Park	Northeast
STLI	Statue of Liberty National Monument	Northeast
SUCR	Sunset Crater Volcano National Monument	Intermountain
THRO	Theodore Roosevelt National Park	Midwest
TIMU	Timucuan Ecological and Historic Preserve	Southeast
TONT	Tonto National Monument	Intermountain
TUZI	Tuzigoot National Monument	Intermountain
UPDE	Upper Delaware Scenic and Recreation River	Northeast
VAFO	Valley Forge National Historical Park	Northeast
VIIS	Virgin Islands National Park	Southeast
VOYA	Voyageurs National Park	Midwest
WACA	Walnut Canyon National Monument	Intermountain
WEIR	Weir Farm National Historical Site	Northeast
WRST	Wrangell-St. Elias National Park and Preserve	Alaska
WUPA	Wupatki National Monument	Intermountain
YELL	Yellowstone National Park	Intermountain
YOSE	Yosemite National Park	Pacific West
ZION	Zion National Park	Intermountain

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As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The Department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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